

Earbuds practice assignment

Task 1

Based on the 2019 SQA N5 assignment

Task 1: wireless earbuds

An electronics company is planning to launch new wireless earbuds. A graphic artist has produced a series of sketches to aid the manufacture of the earbuds.

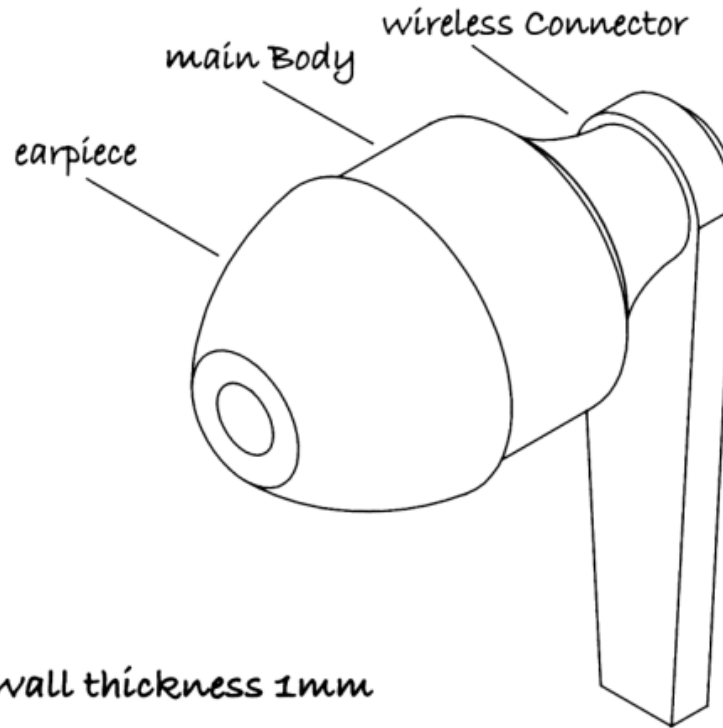
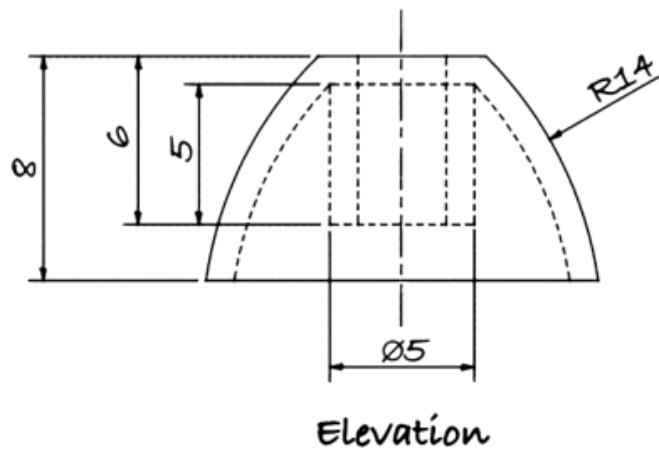
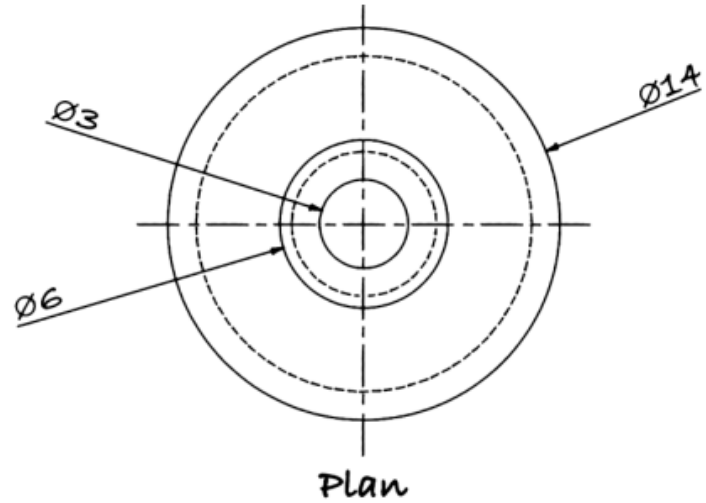
Using the sketches and information shown on data sheet 1a, 1b and 1c, model and assemble the earbud components using 3D CAD software.

From these models, produce production drawings that will allow the earbuds to be manufactured.

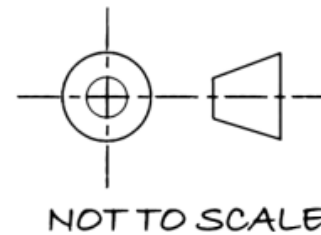
Data sheet 1a

The following graphics will help you produce the component parts and the assembly of a wireless earbud. You should model this using 3D CAD software and then create production drawings using electronic methods.

Earpiece

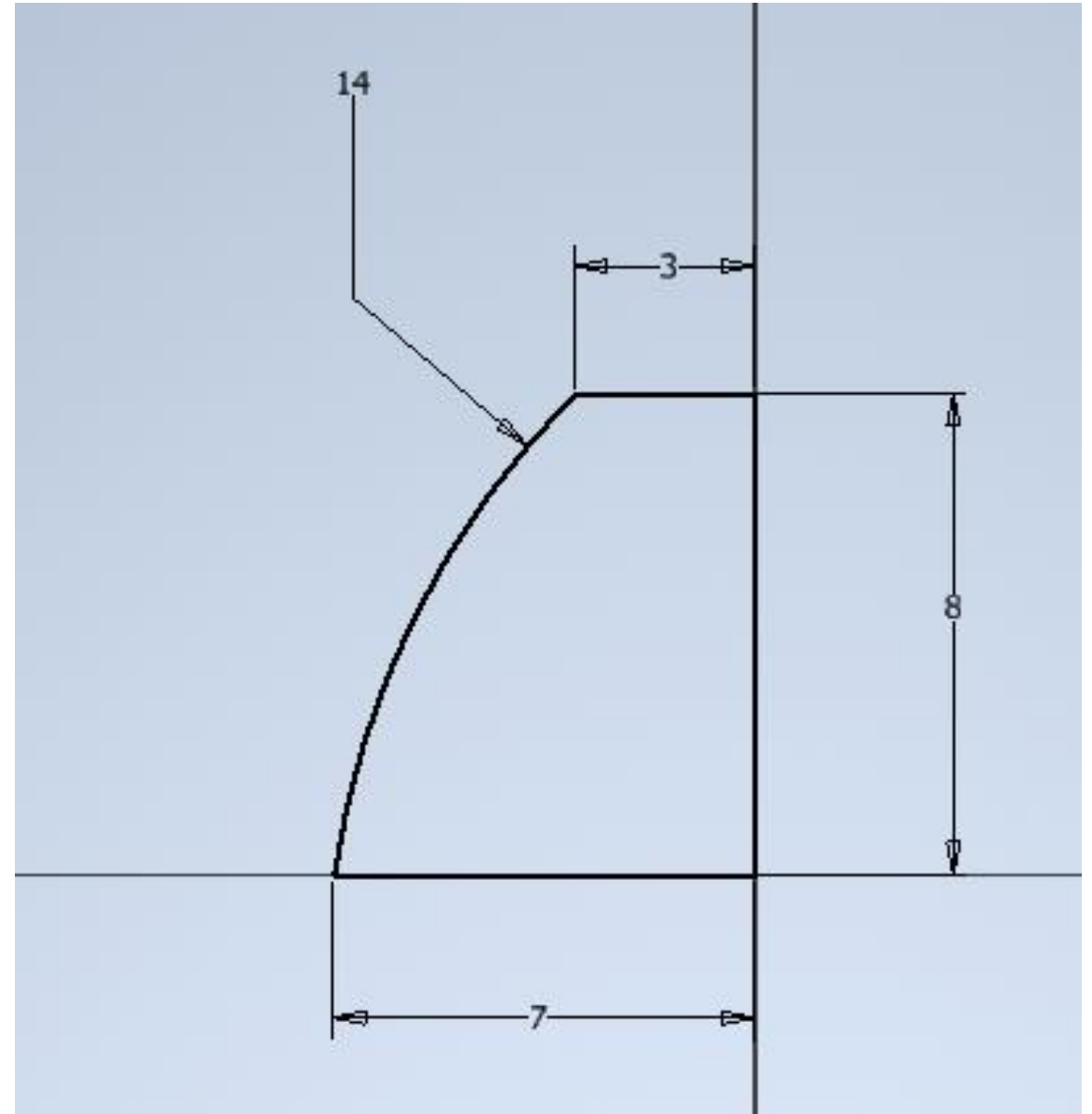
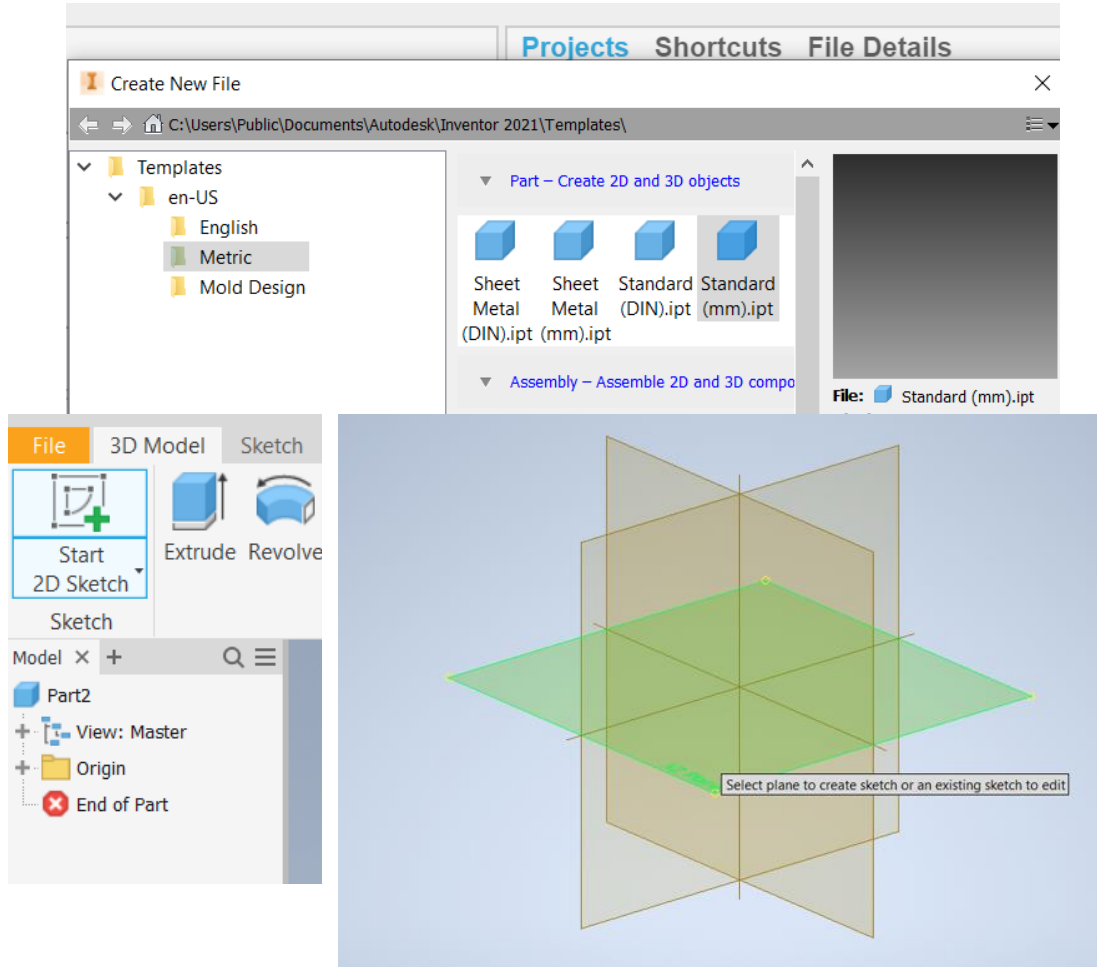


wall thickness 1mm

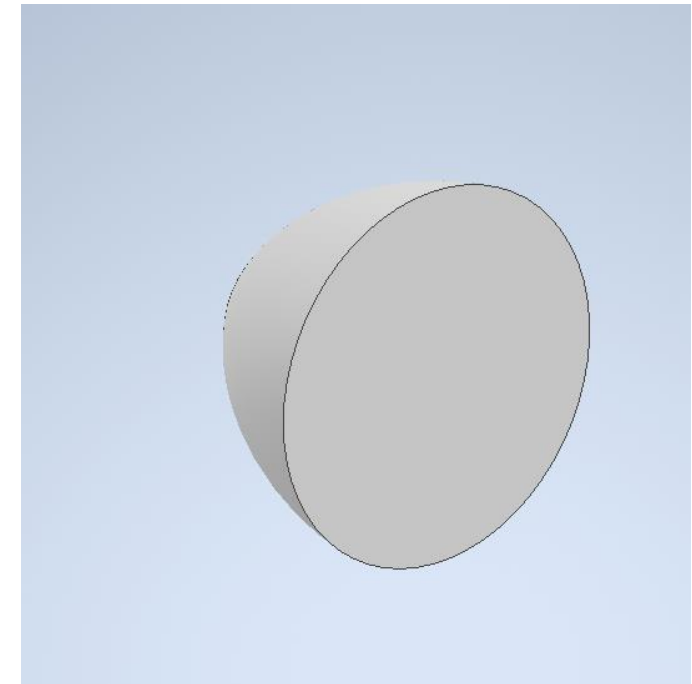
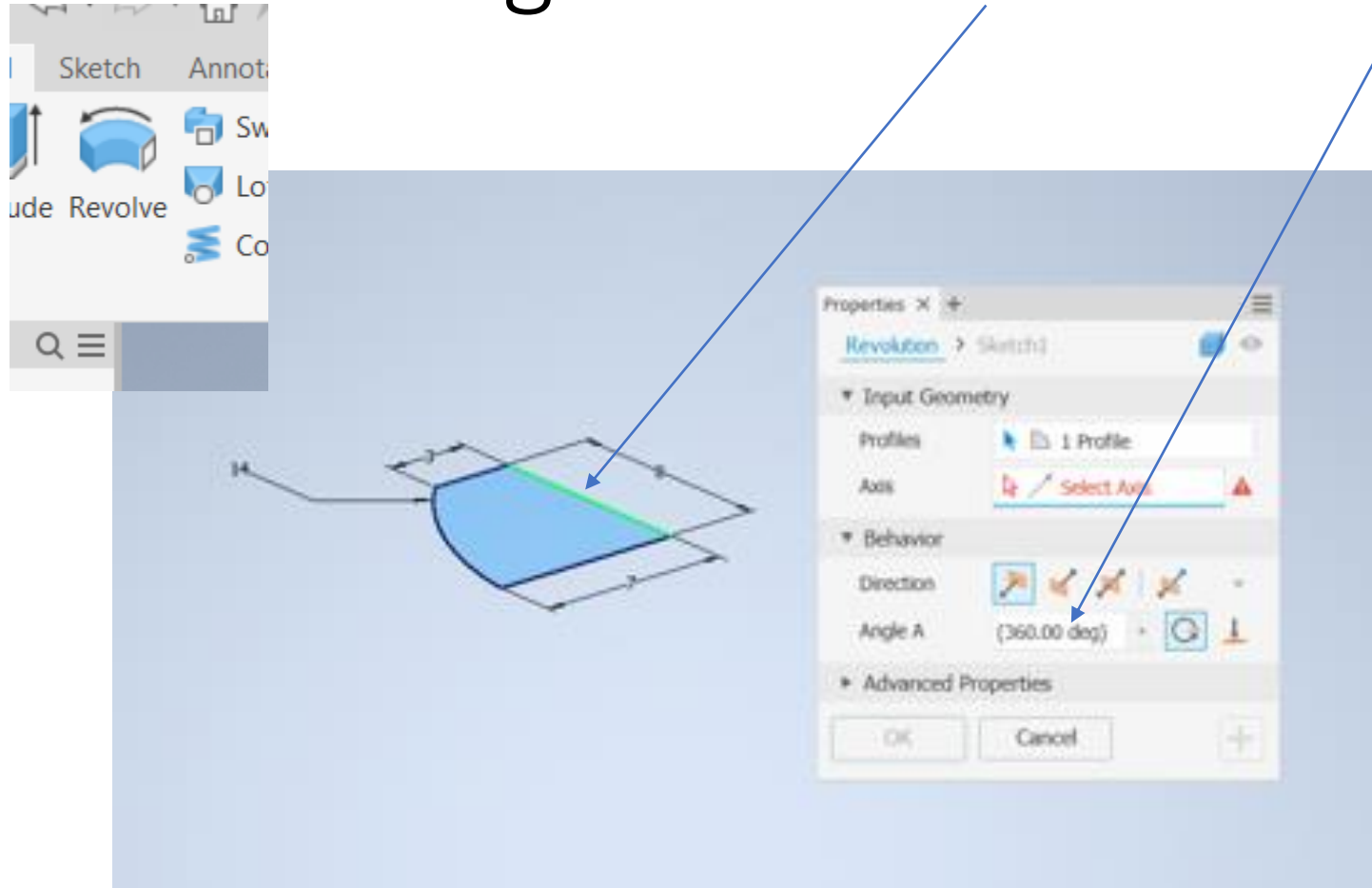


Create a new metric part and place a 2D **sketch** on a plane.

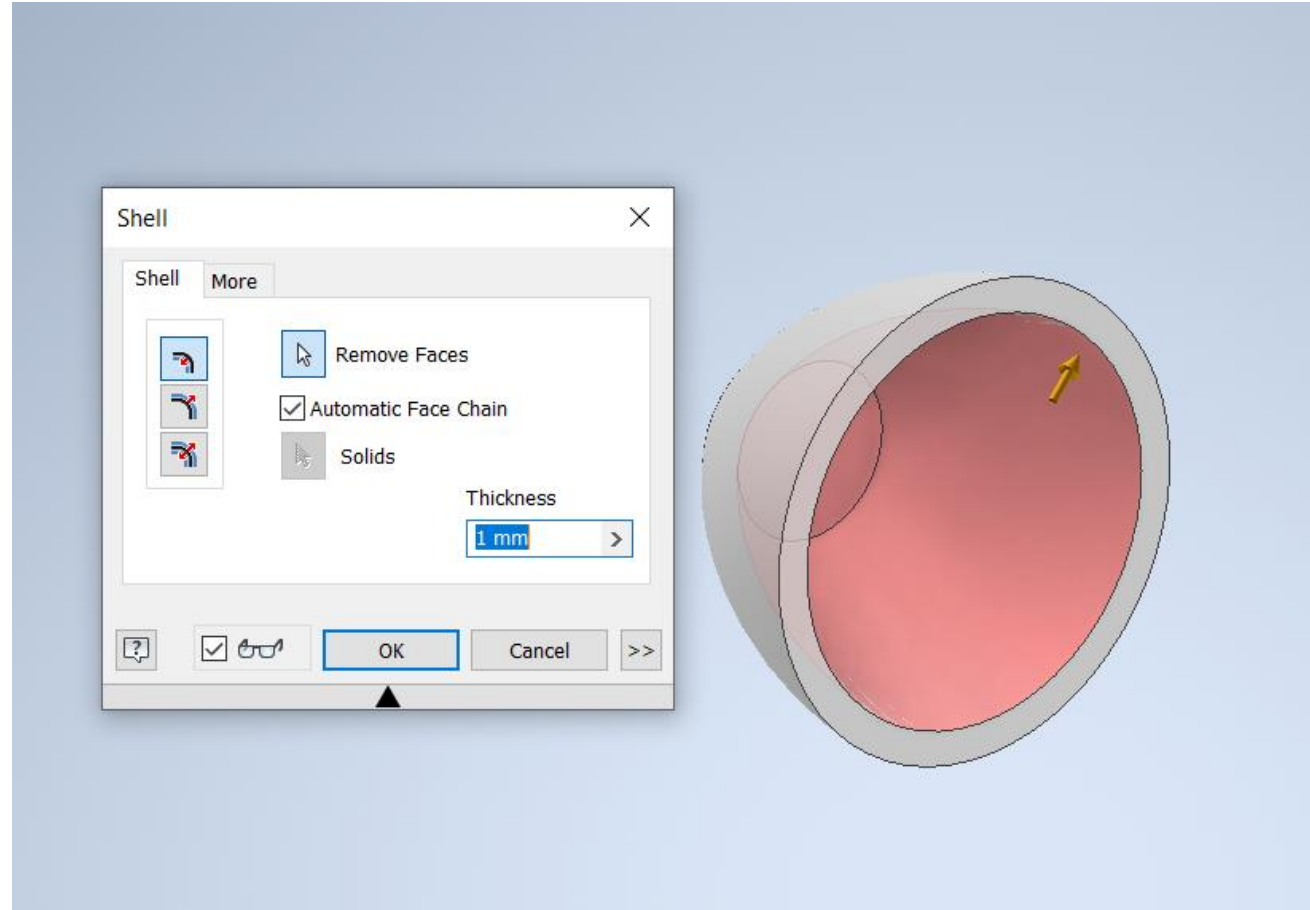
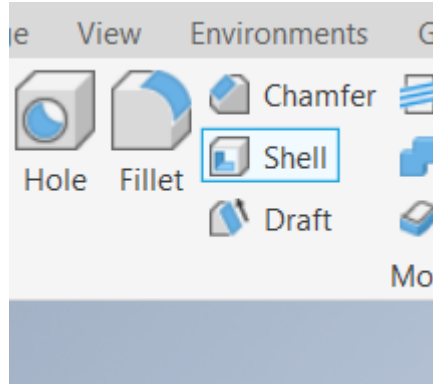
Draw the shape shown representing half of the earbud earpiece taking dimensions from the drawing.
Finish Sketch.



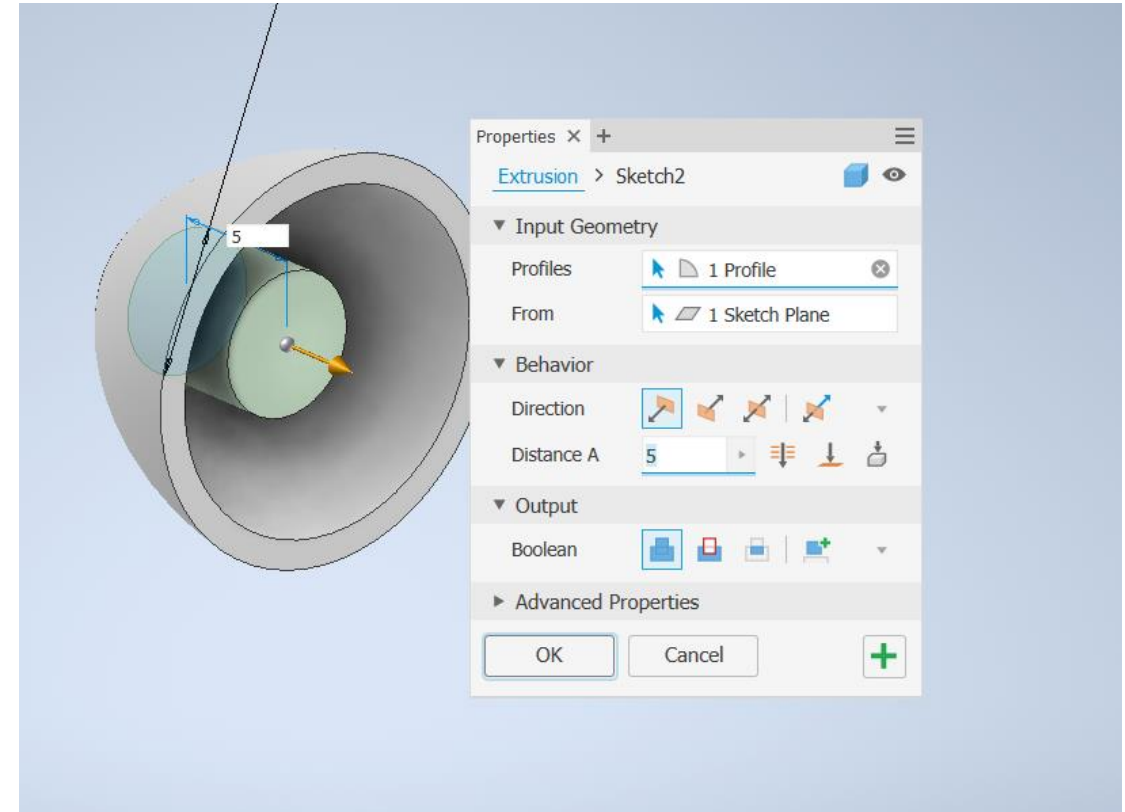
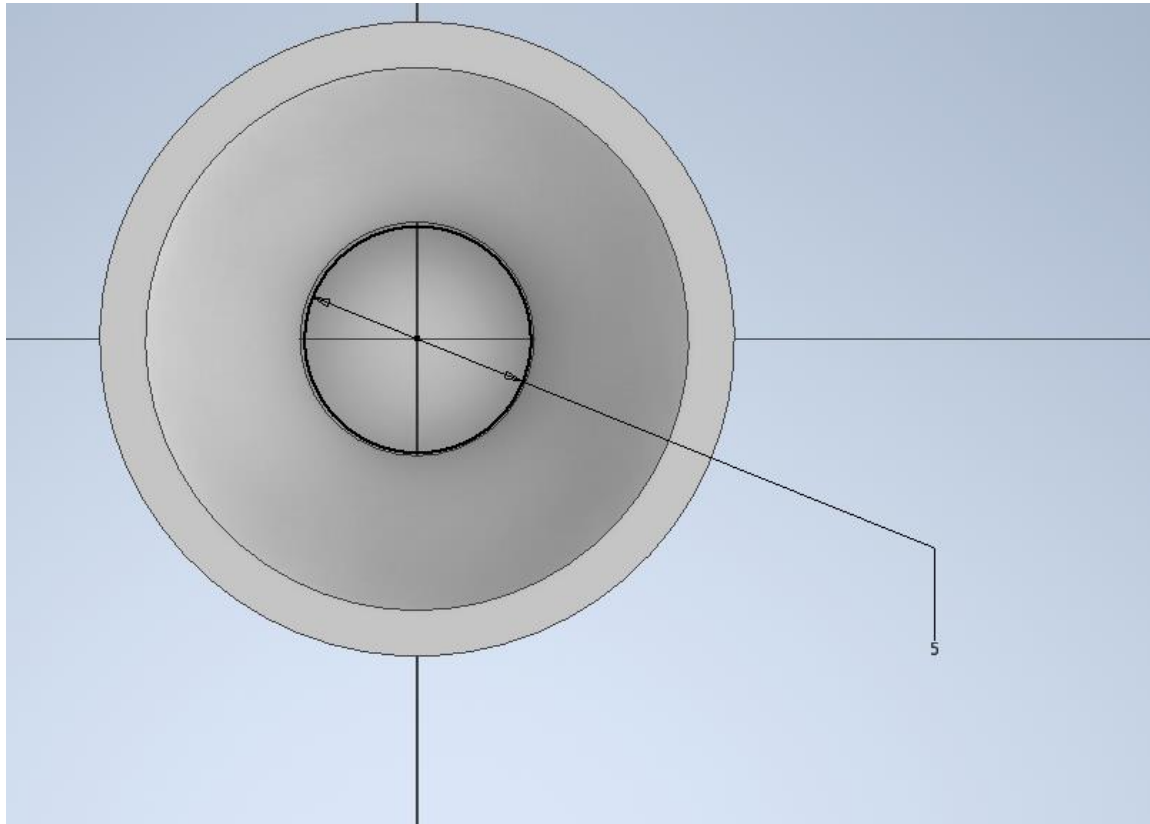
Revolve the shape through 360 degrees selecting the 8mm side as the axis



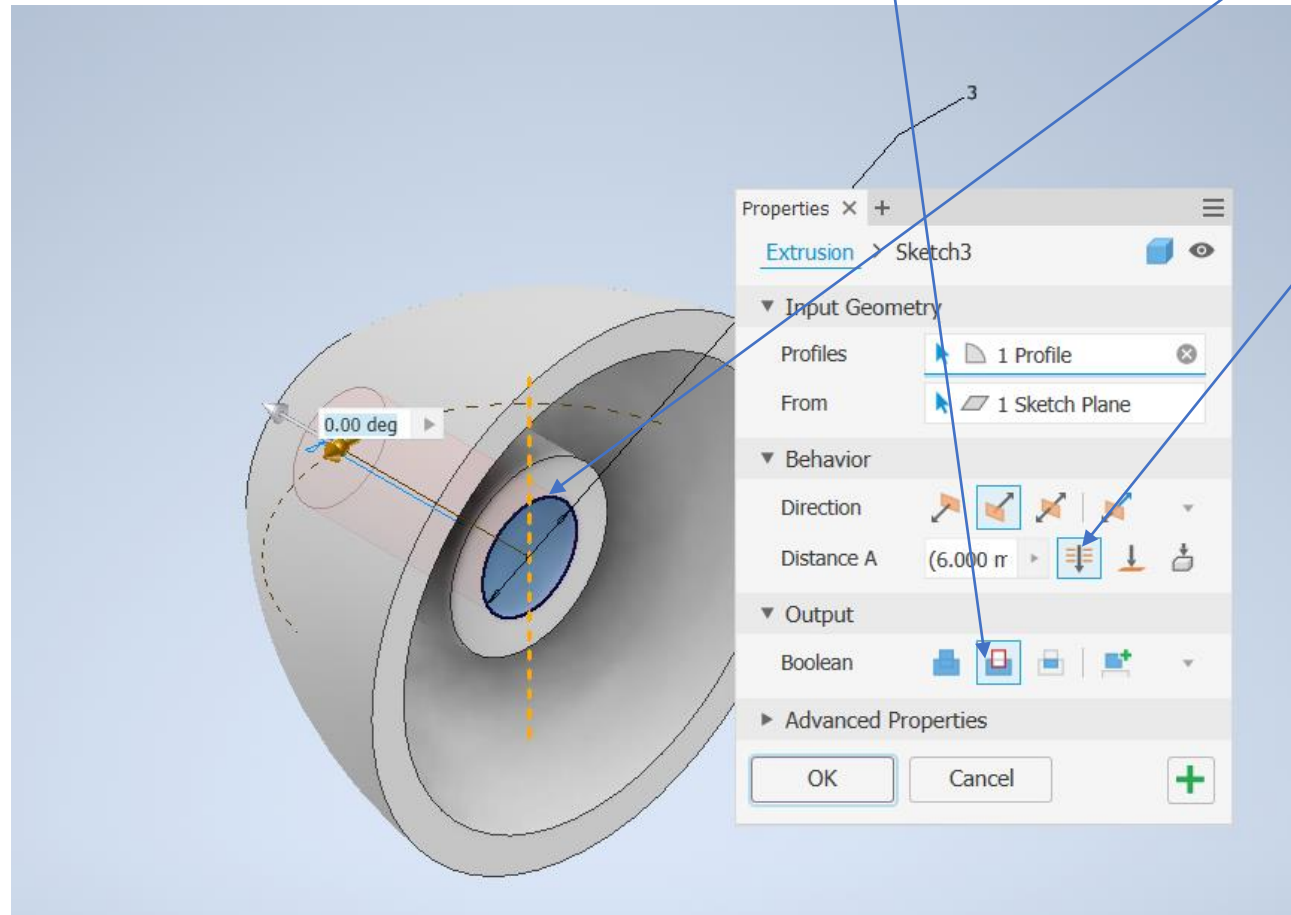
Shell removing bottom face wall thickness 1mm



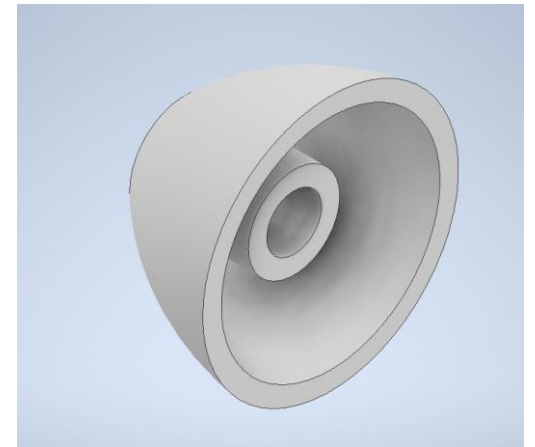
Place a sketch on the inner top surface of the earpiece, sketch a circle as shown and dimension to 5mm. Extrude add for 5mm.



Place a **sketch** on the new surface, sketch a circle 3mm in diameter and **extrude subtract** through all.



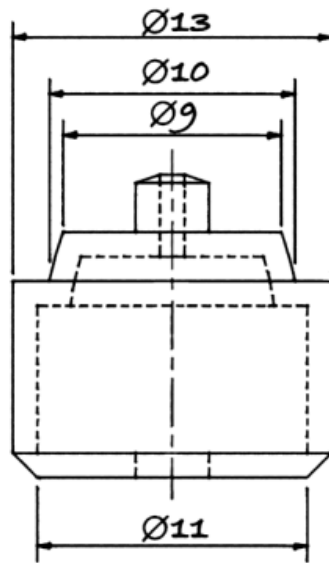
Save as
earpiece



Data sheet 1b

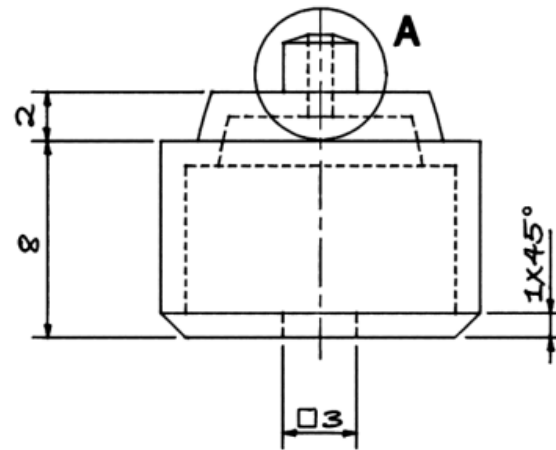
The following graphics will help you produce the component parts and the assembly of a wireless earbud. You should model this using 3D CAD software and then create production drawings using electronic methods.

Main body

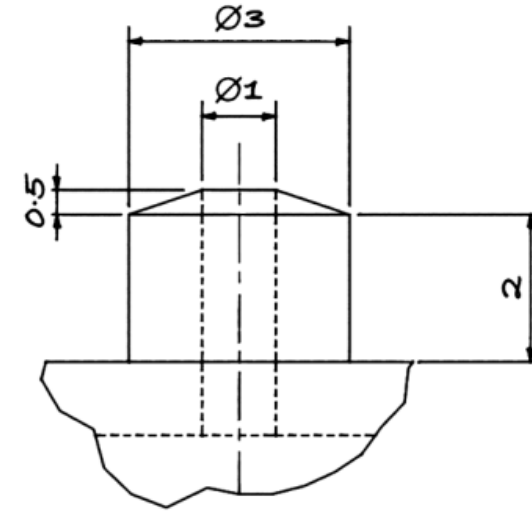


Elevation

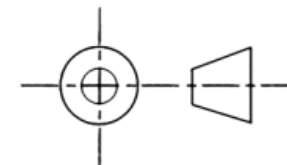
wall thickness 1mm



End Elevation

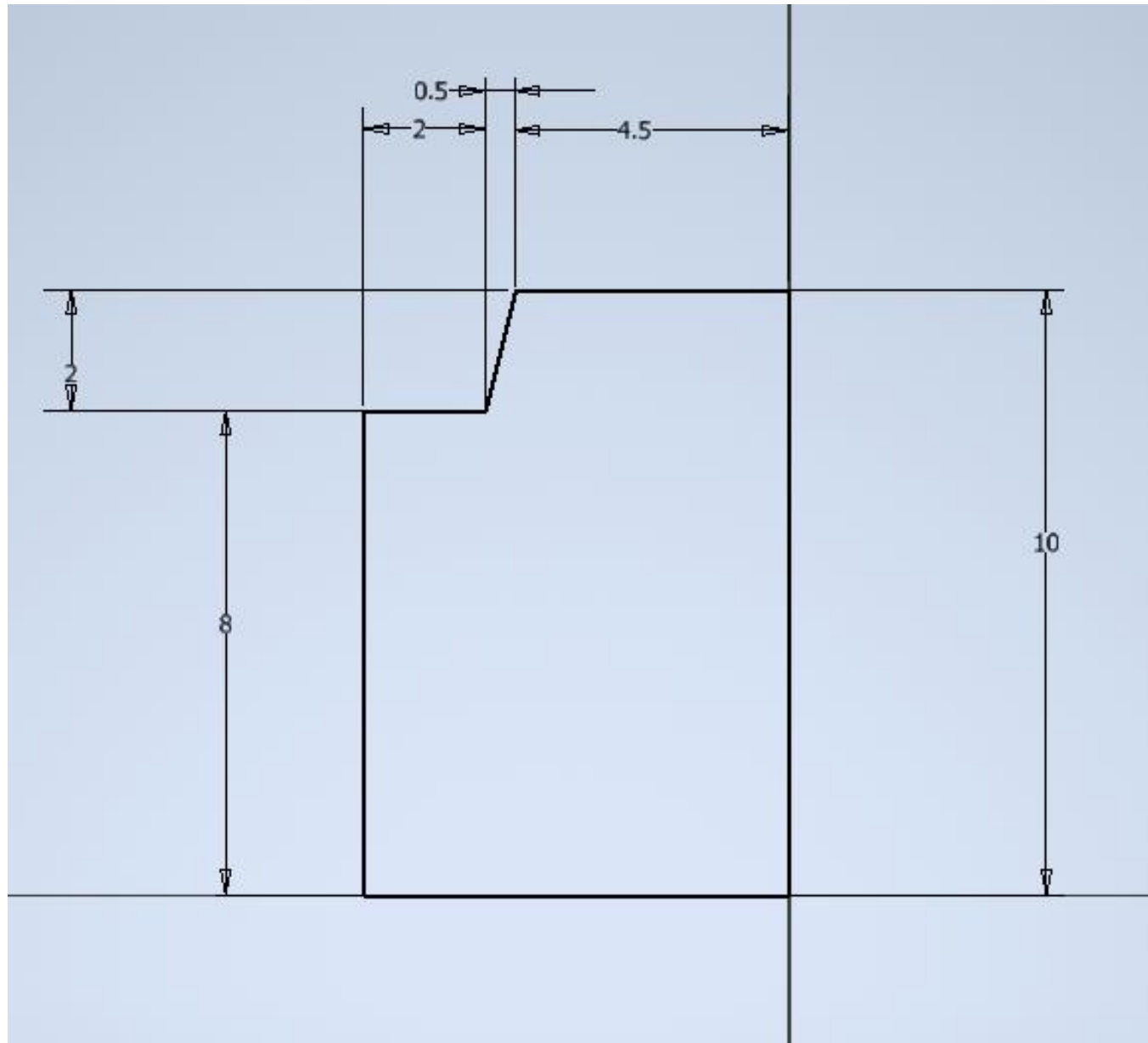


enlarged view A

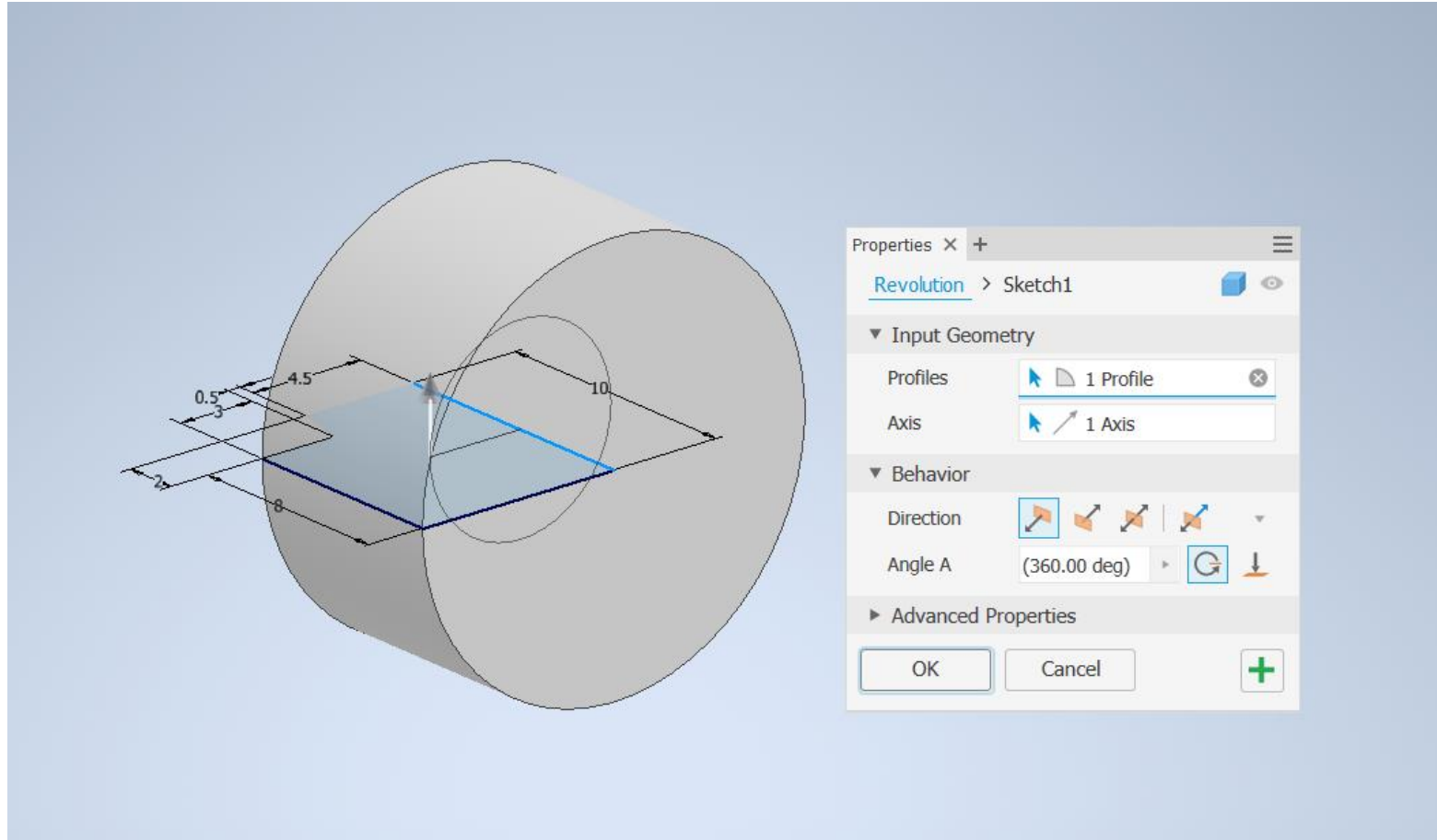


NOT TO SCALE

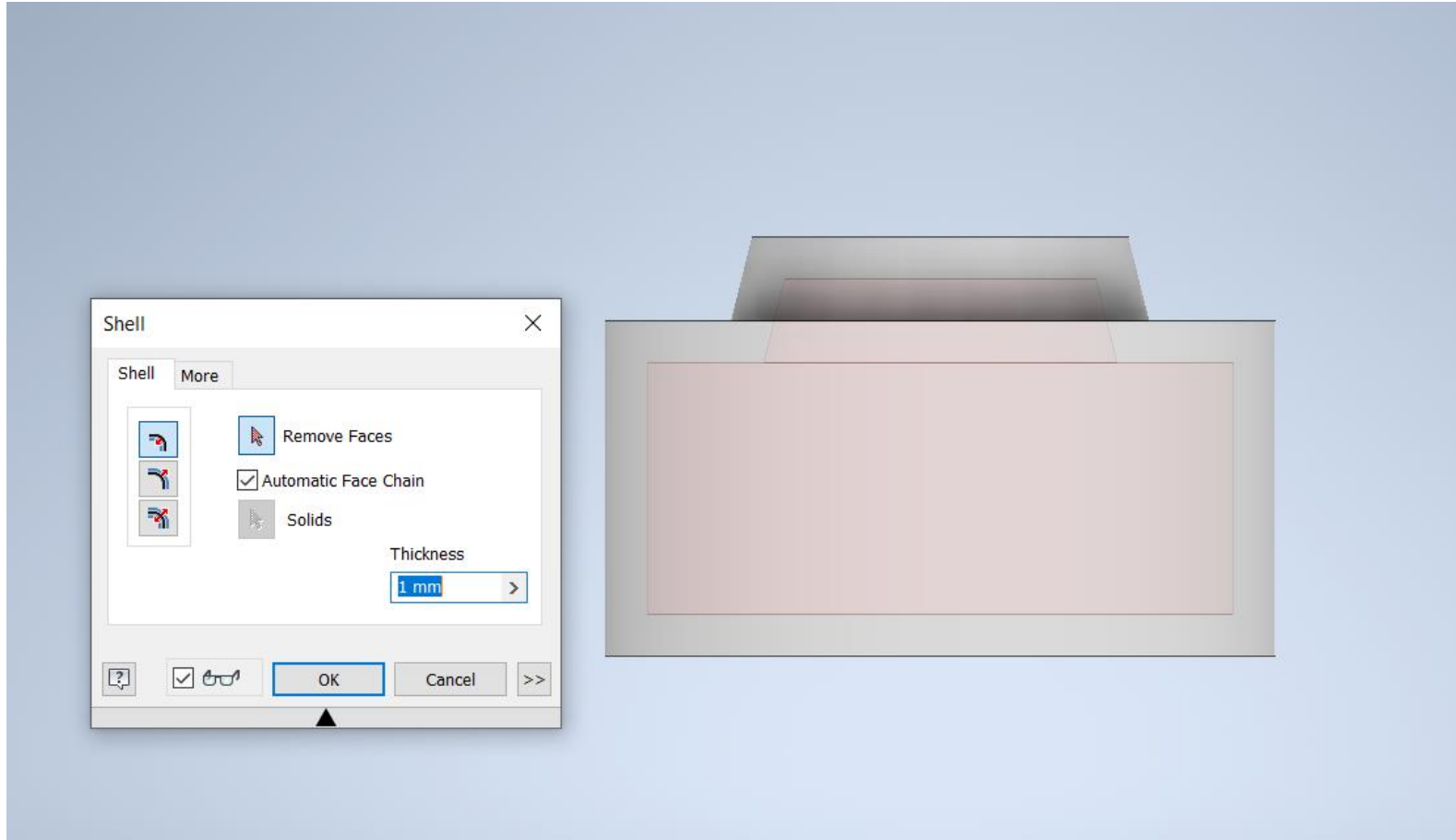
Open a new metric part, and sketch the shape shown



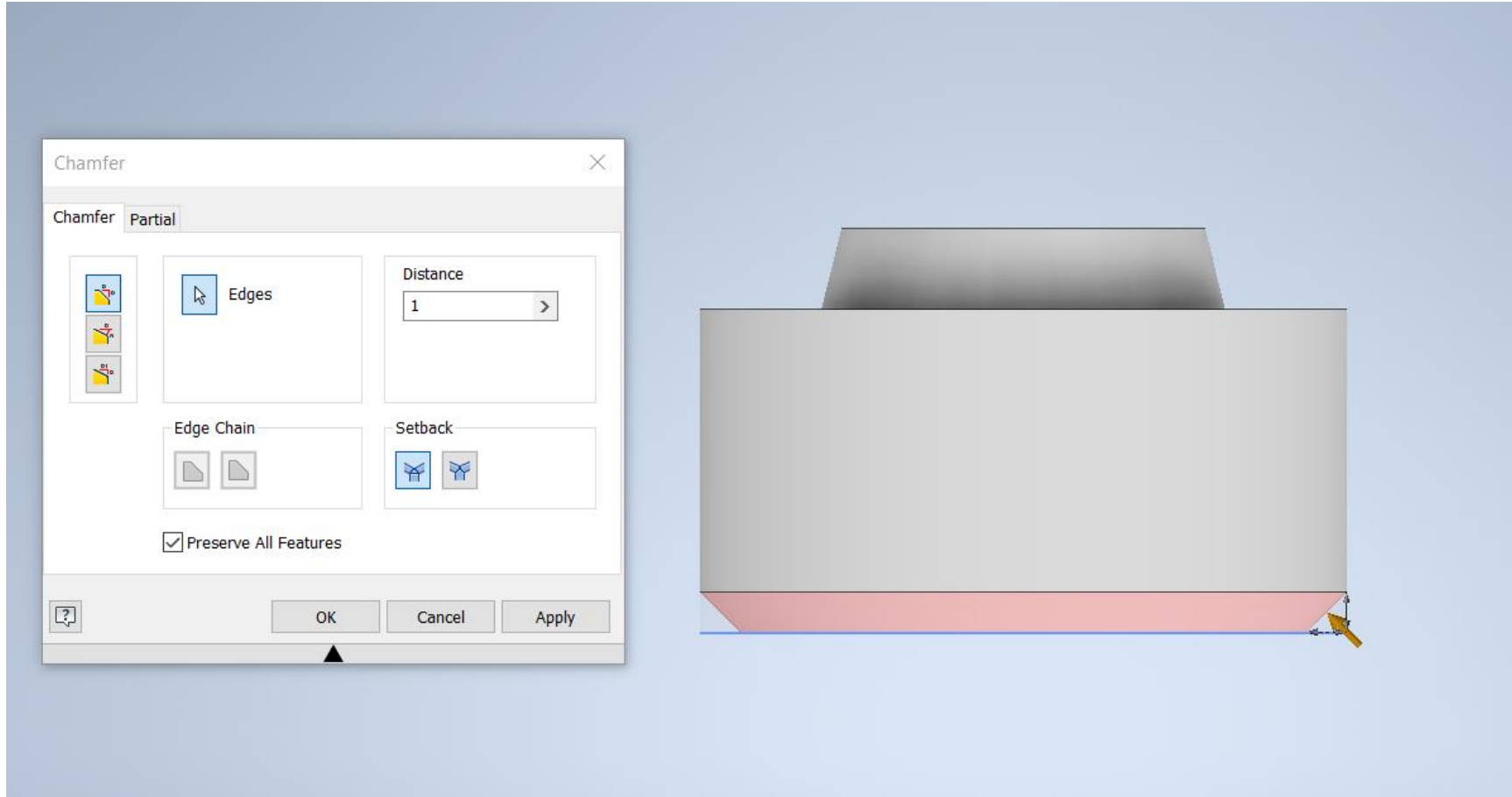
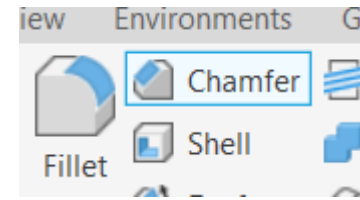
Revolve through 360 degrees with long side as axis



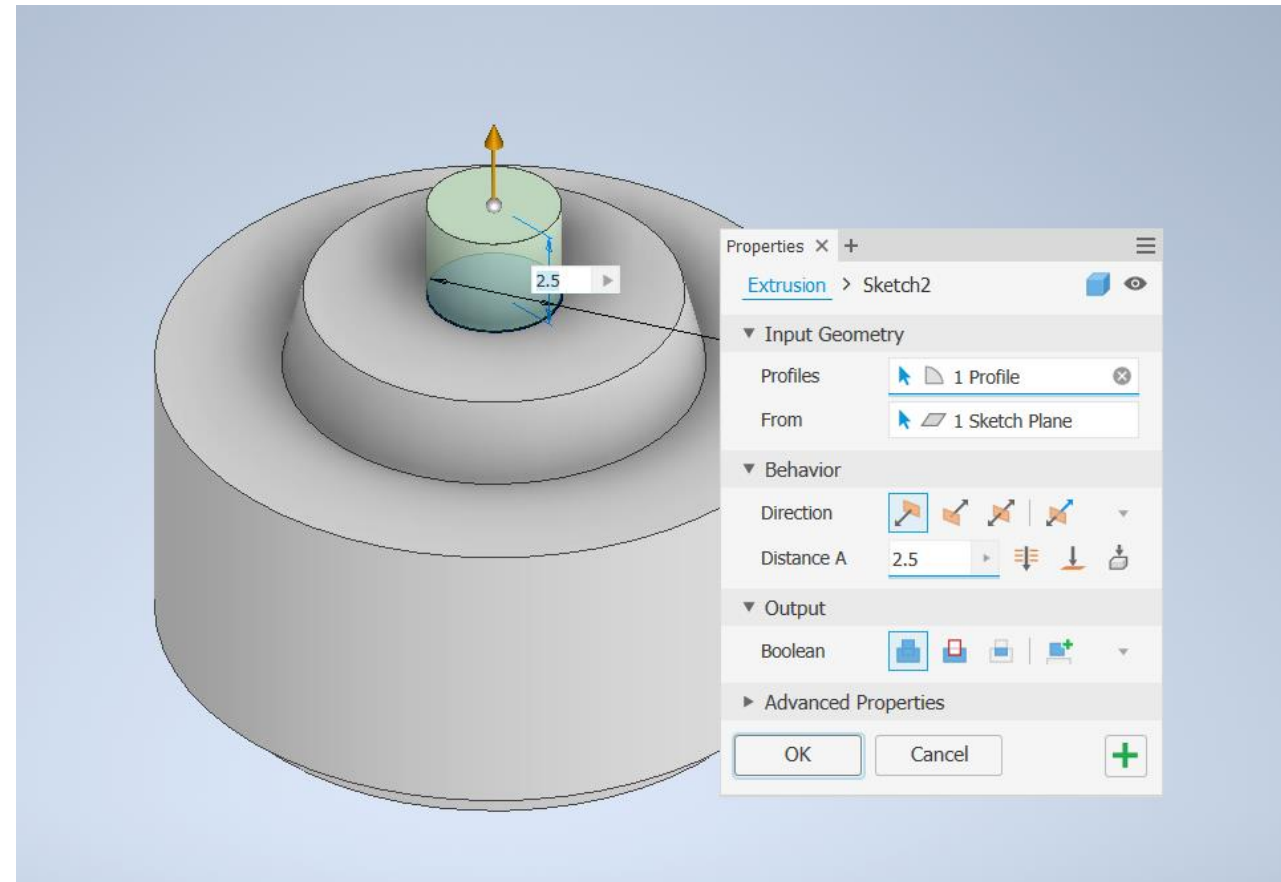
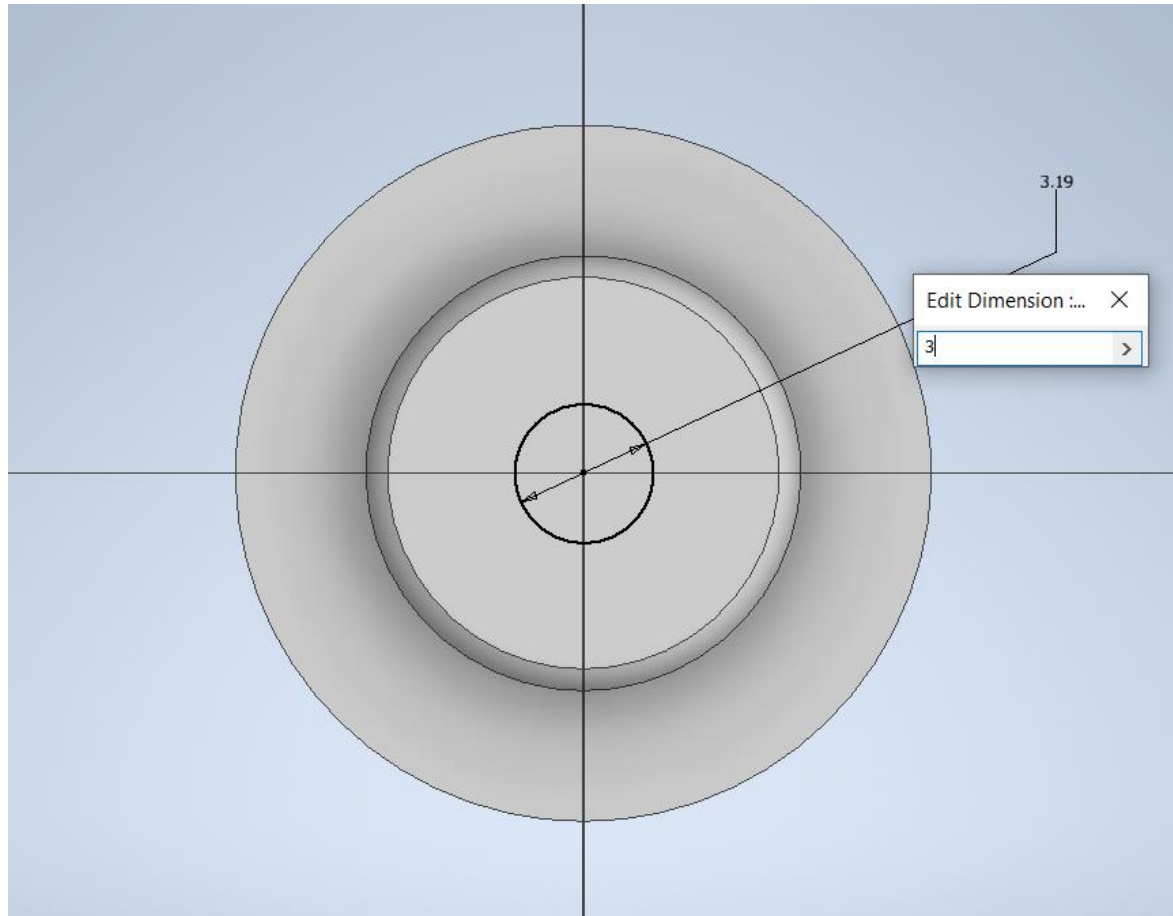
Shell at 1mm wall thickness do not remove any faces



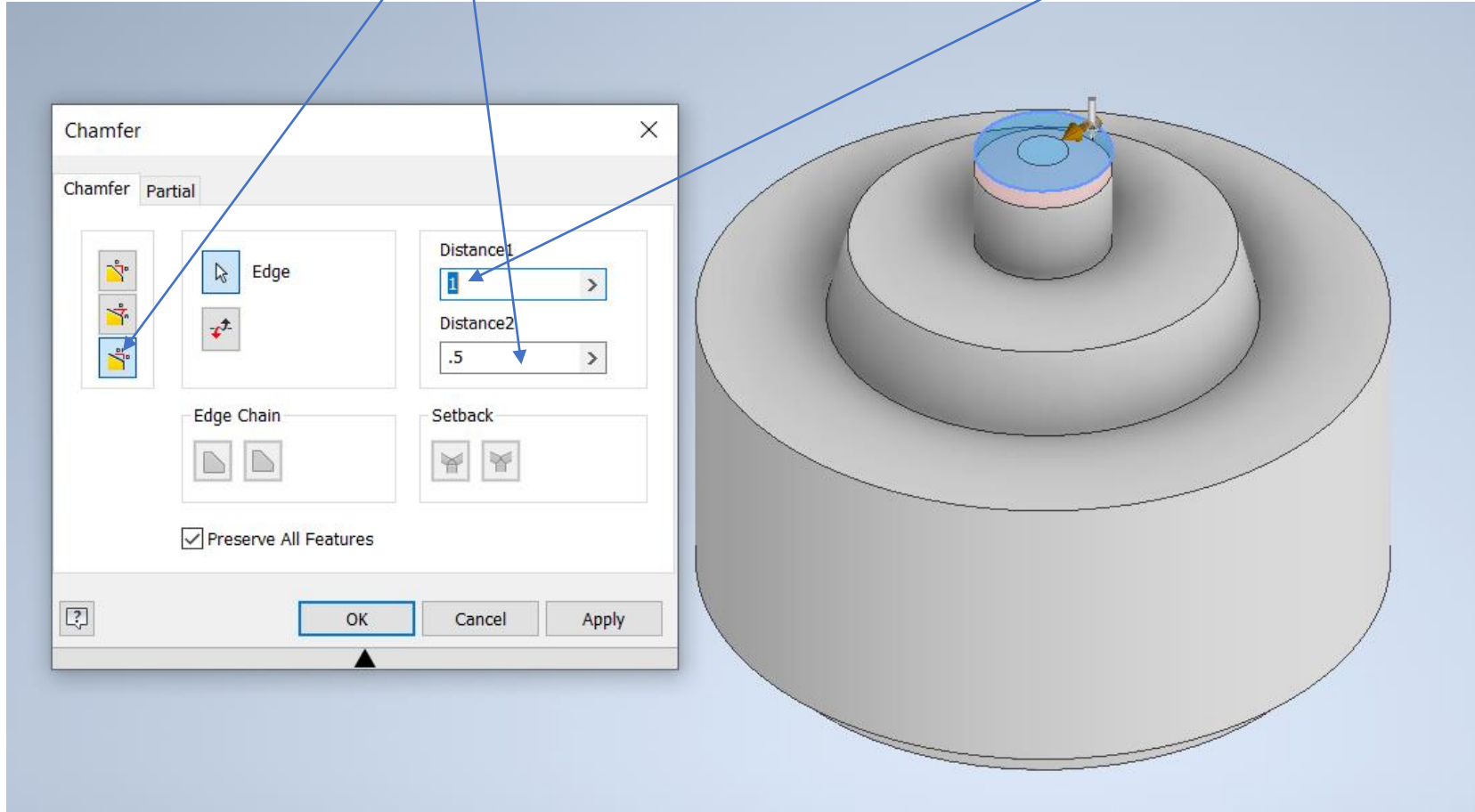
Chamfer base at 1mm@45°



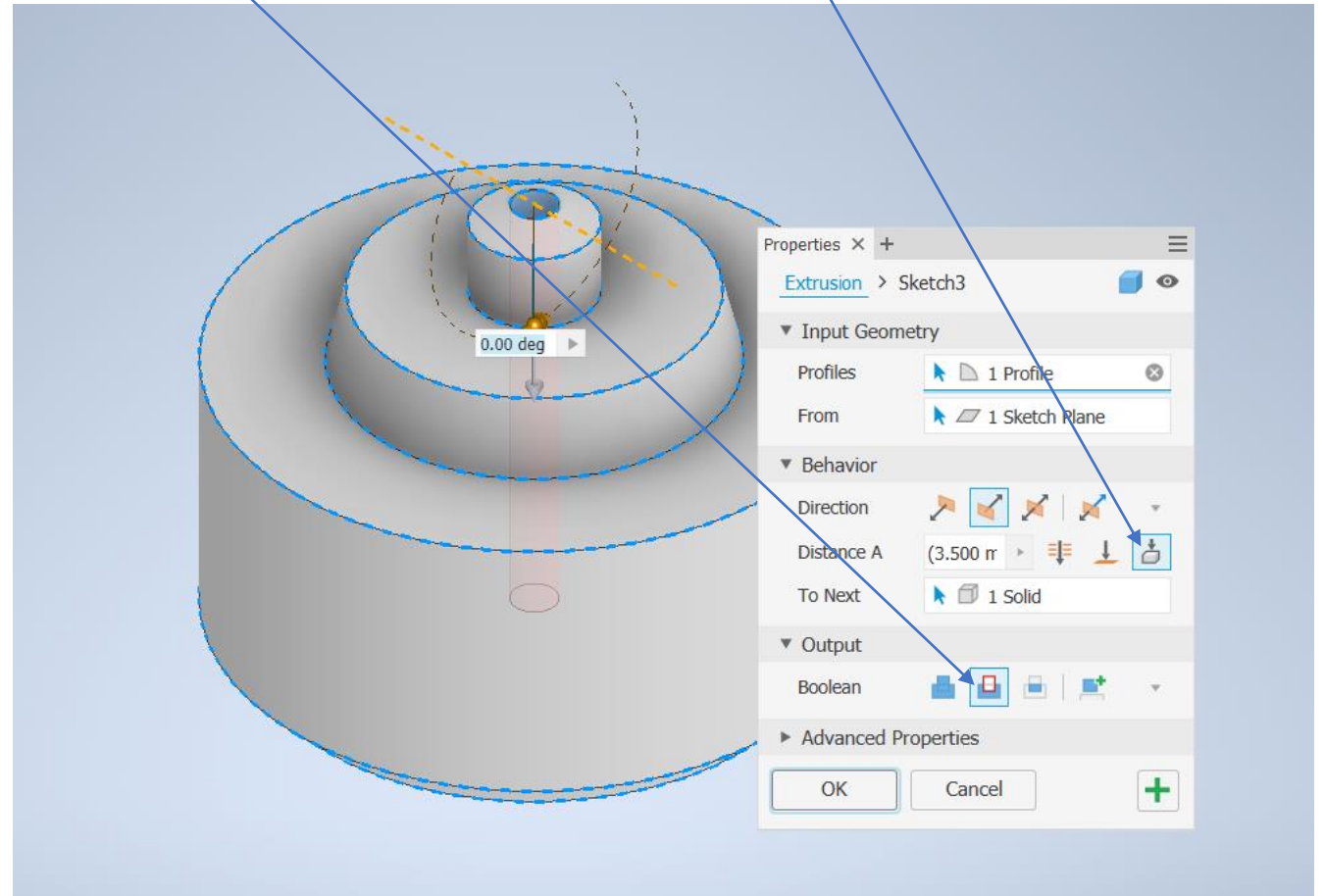
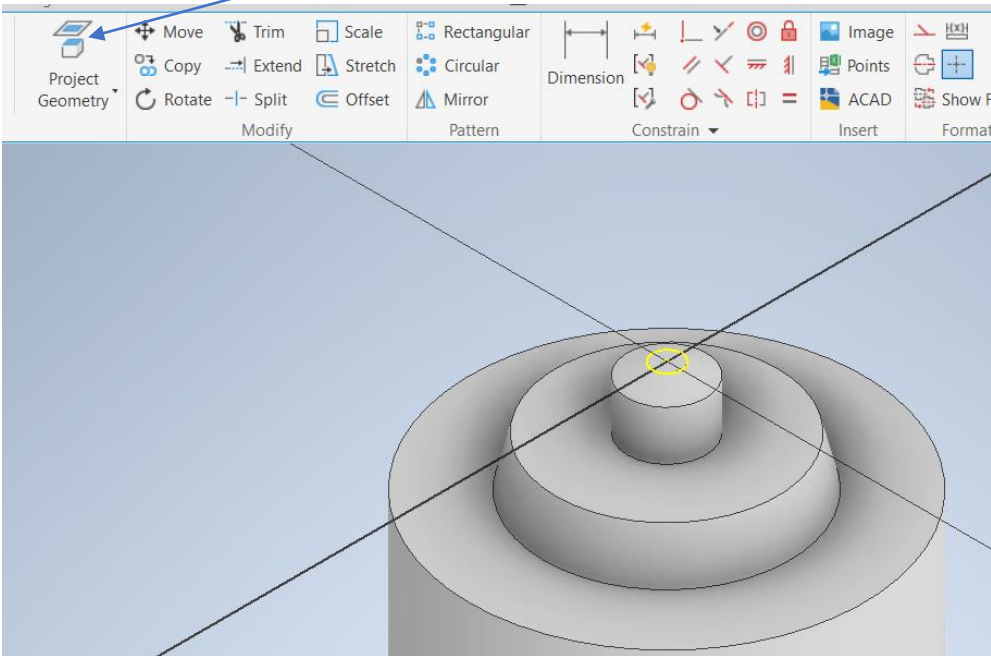
Place a sketch on the top face dimension to 3mm and extrude for 2.5mm



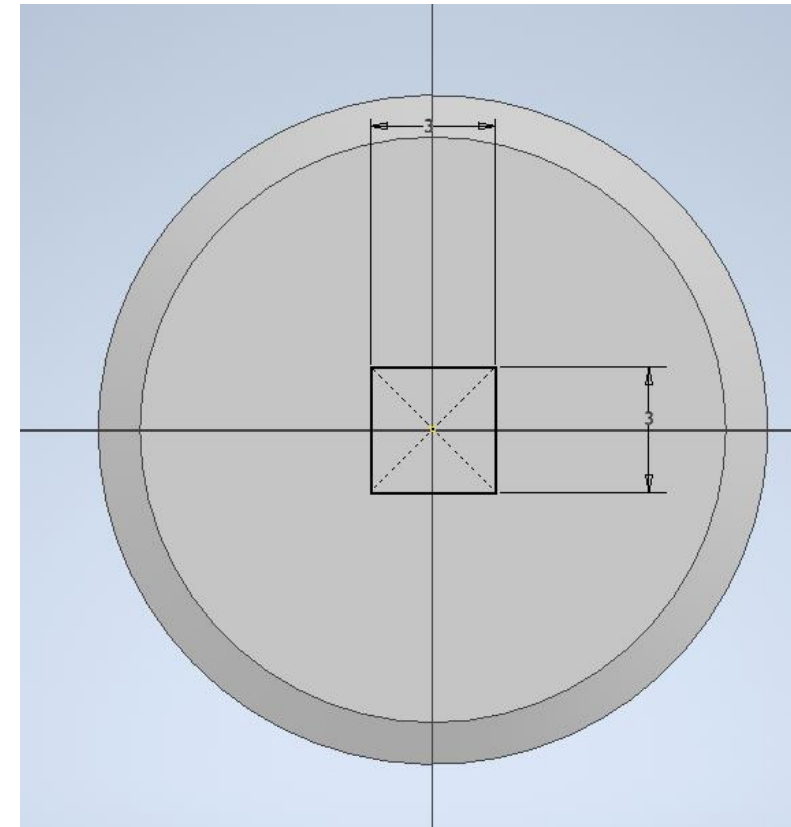
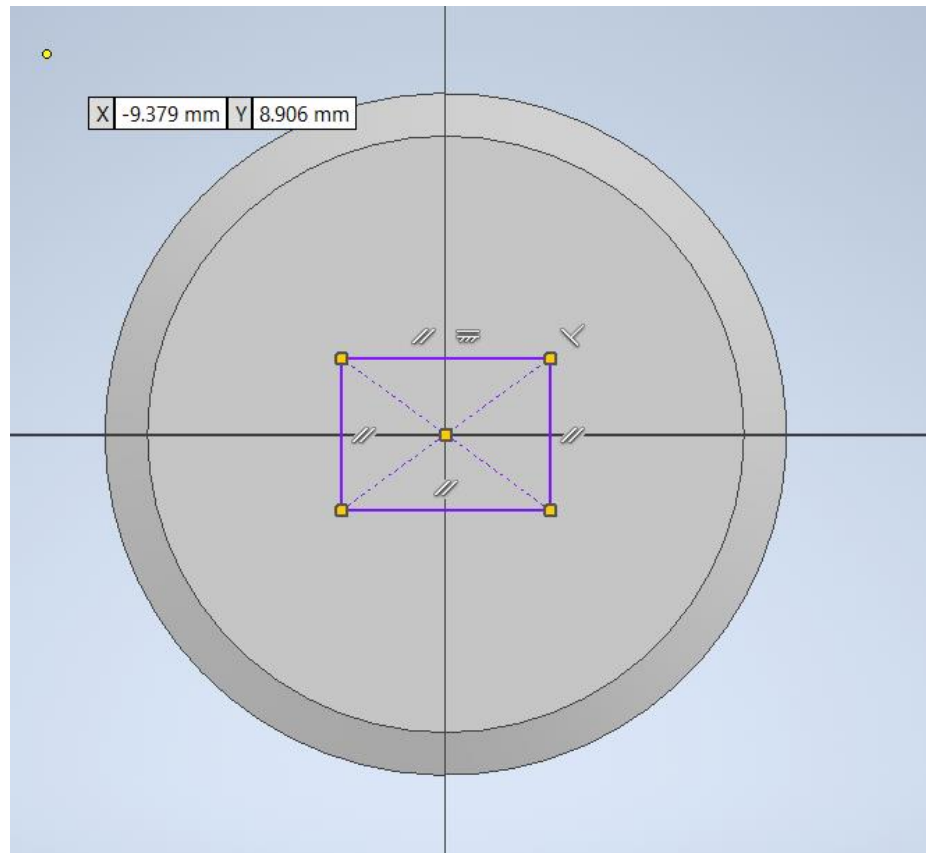
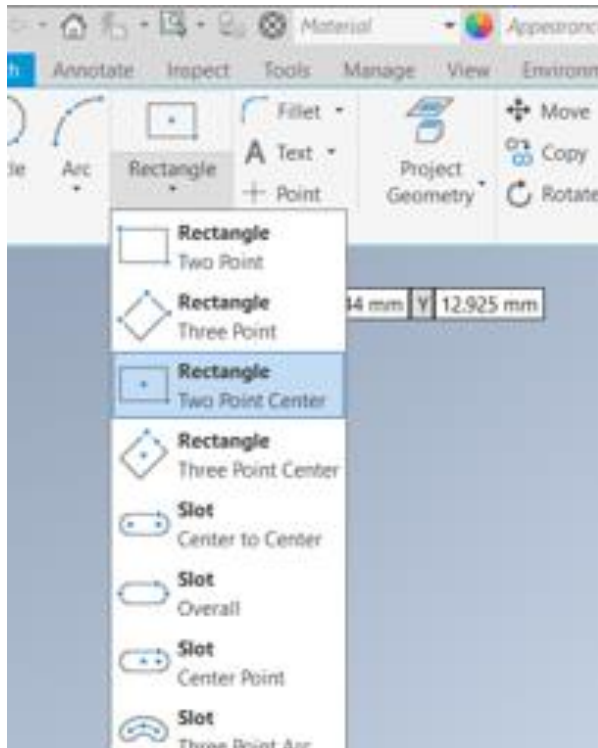
Chamfer using 2 distances distance 1- 1mm
distance 2- 0.5mm.



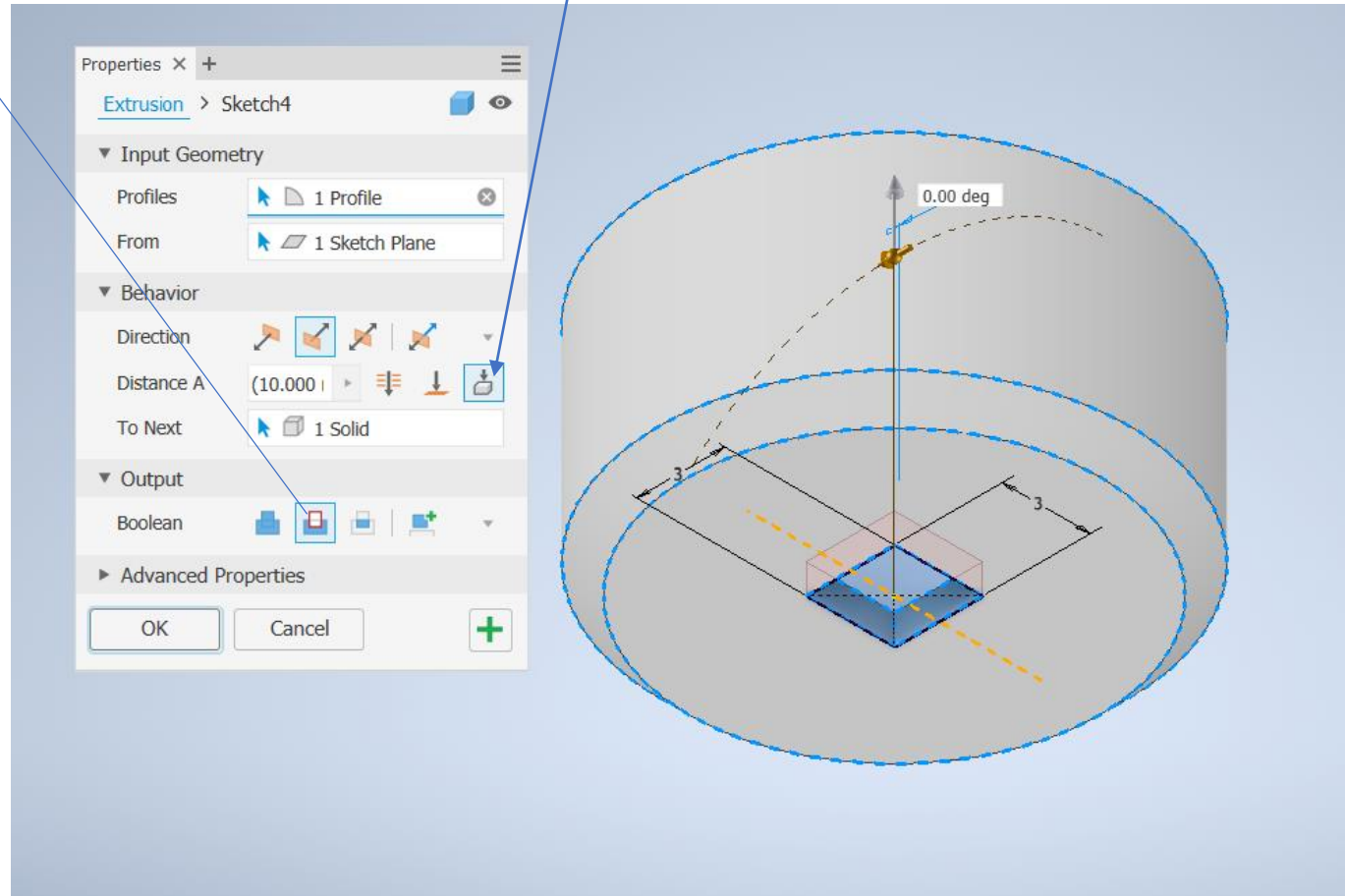
Place a **sketch** on the top and **project geometry** of the top circle and **extrude subtract** to next.



Place a **sketch** on the bottom select two point centre **Rectangle** align with circle centre dimension 3mm square.



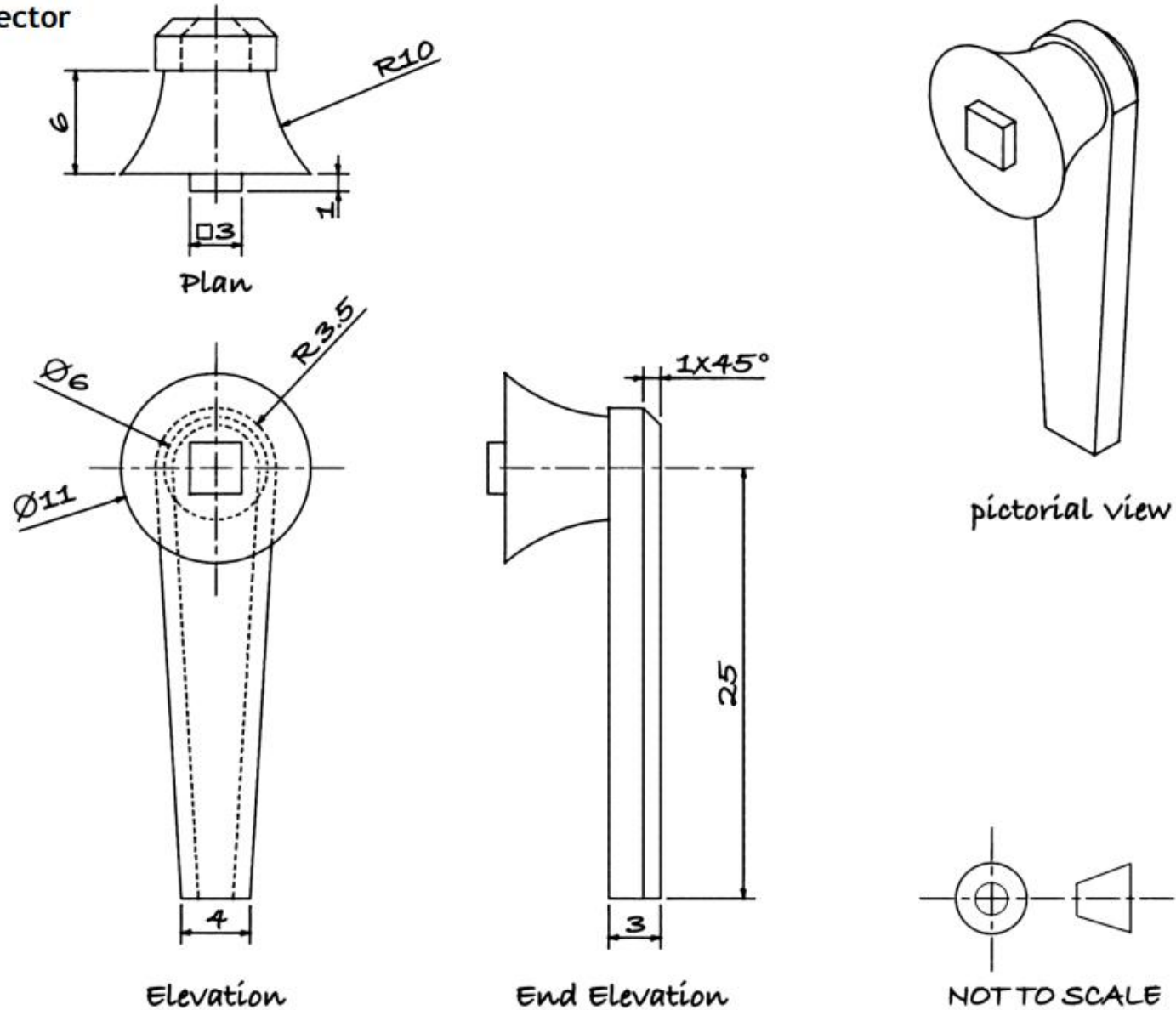
Extrude subtract to next, save as Main Body.



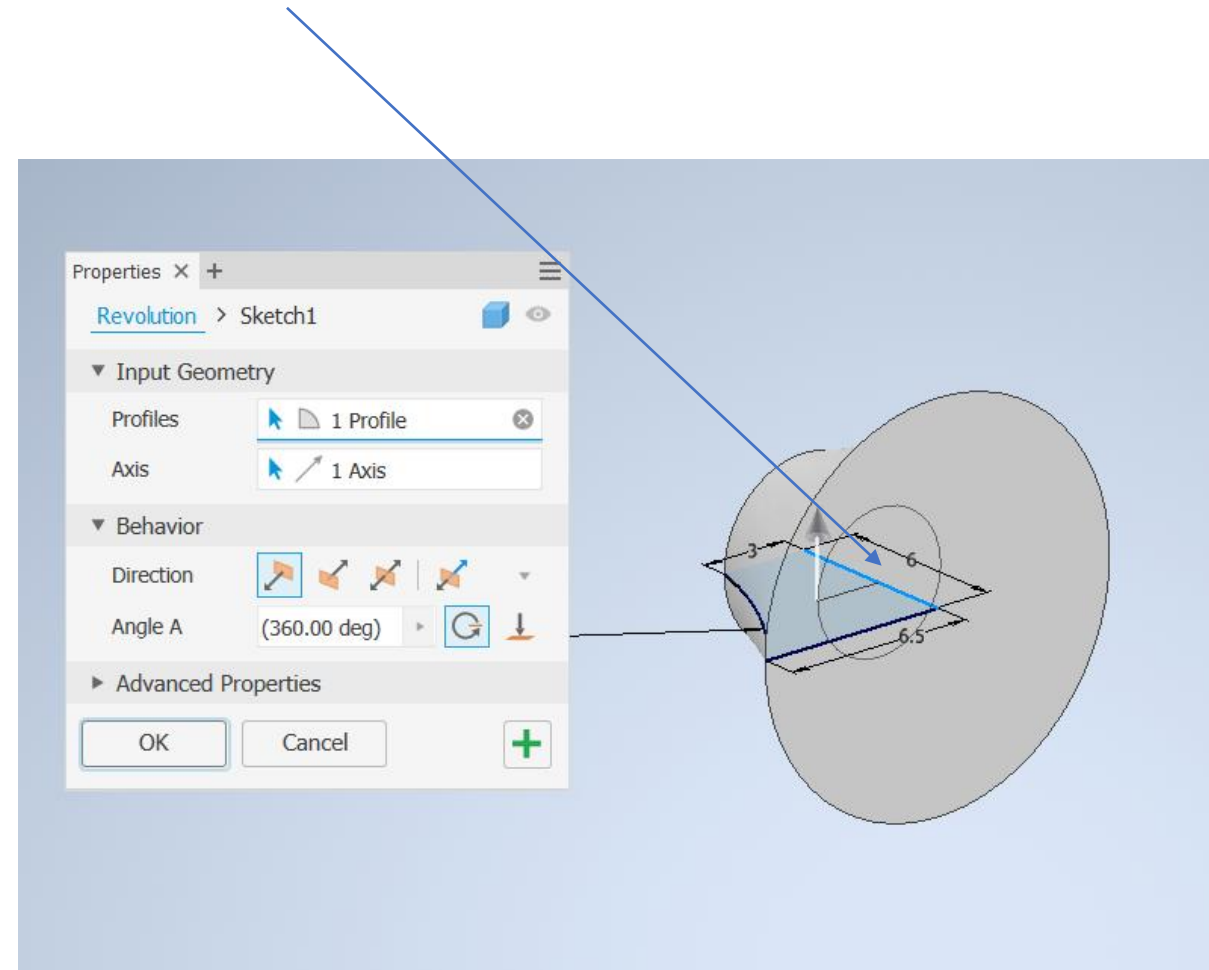
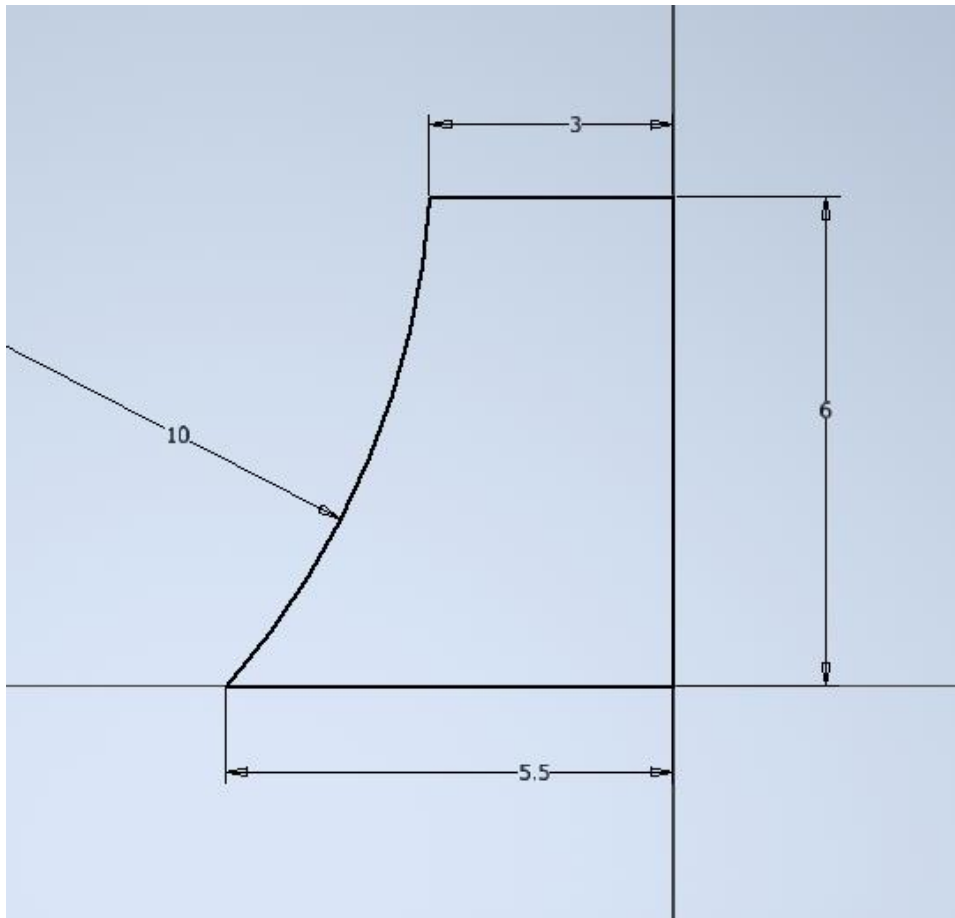
Data sheet 1c

The following graphics will help you produce the component parts and the assembly of a wireless earbud. You should model this using 3D CAD software and then create production drawings using electronic methods.

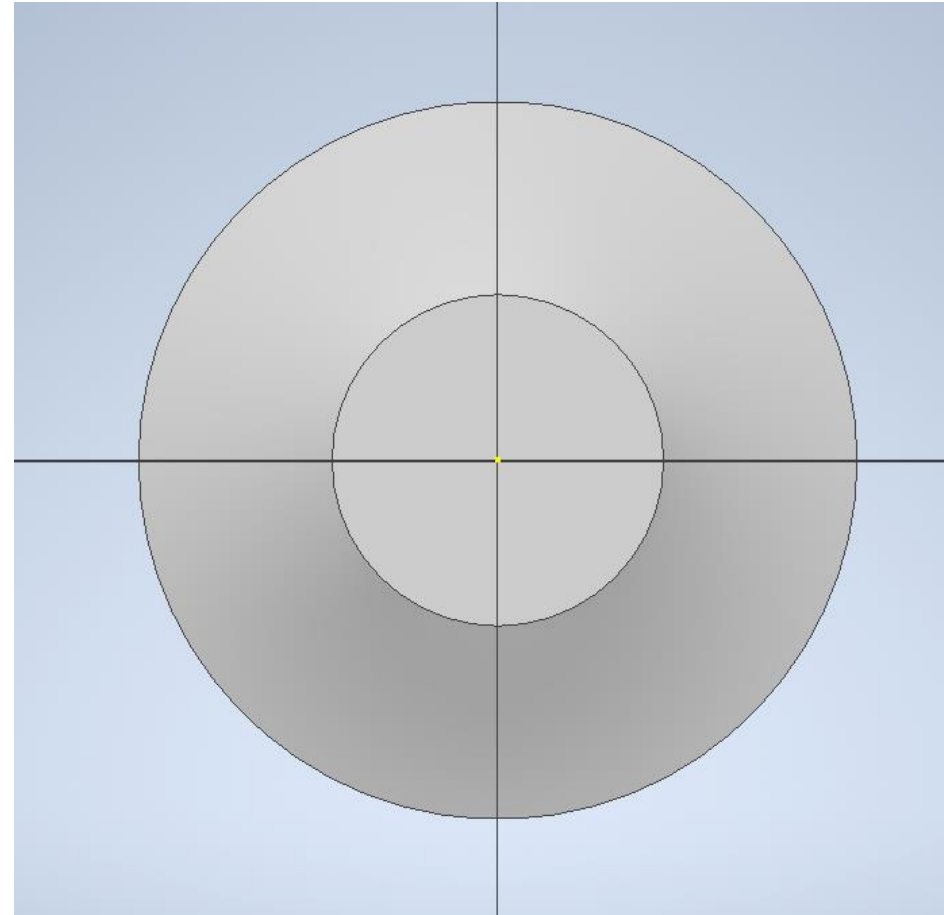
Wireless connector



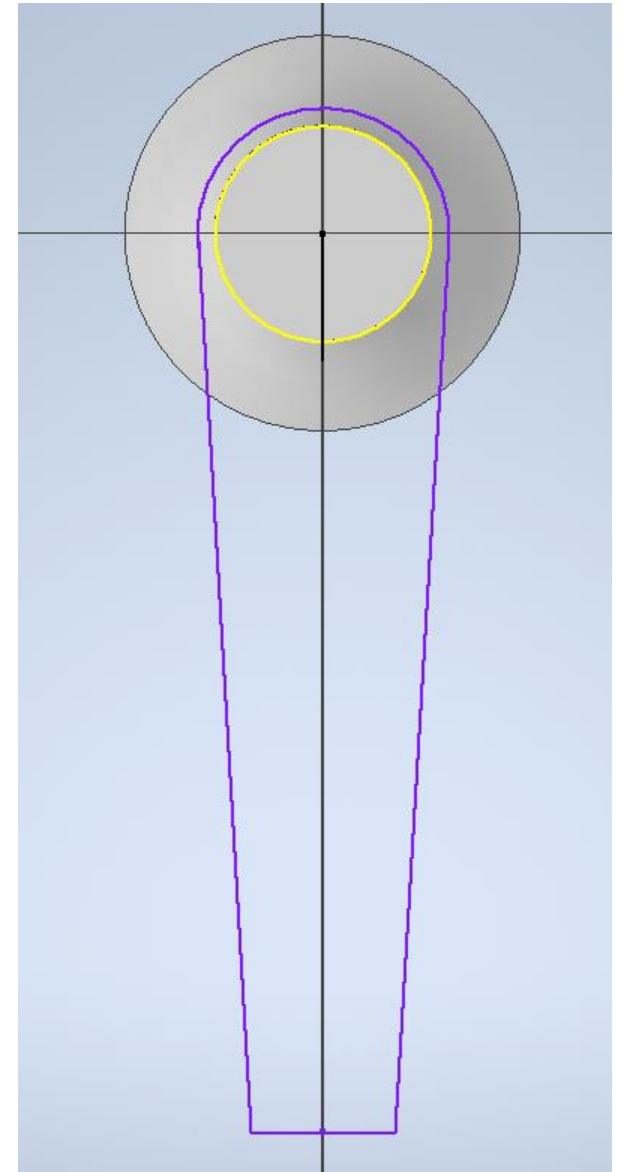
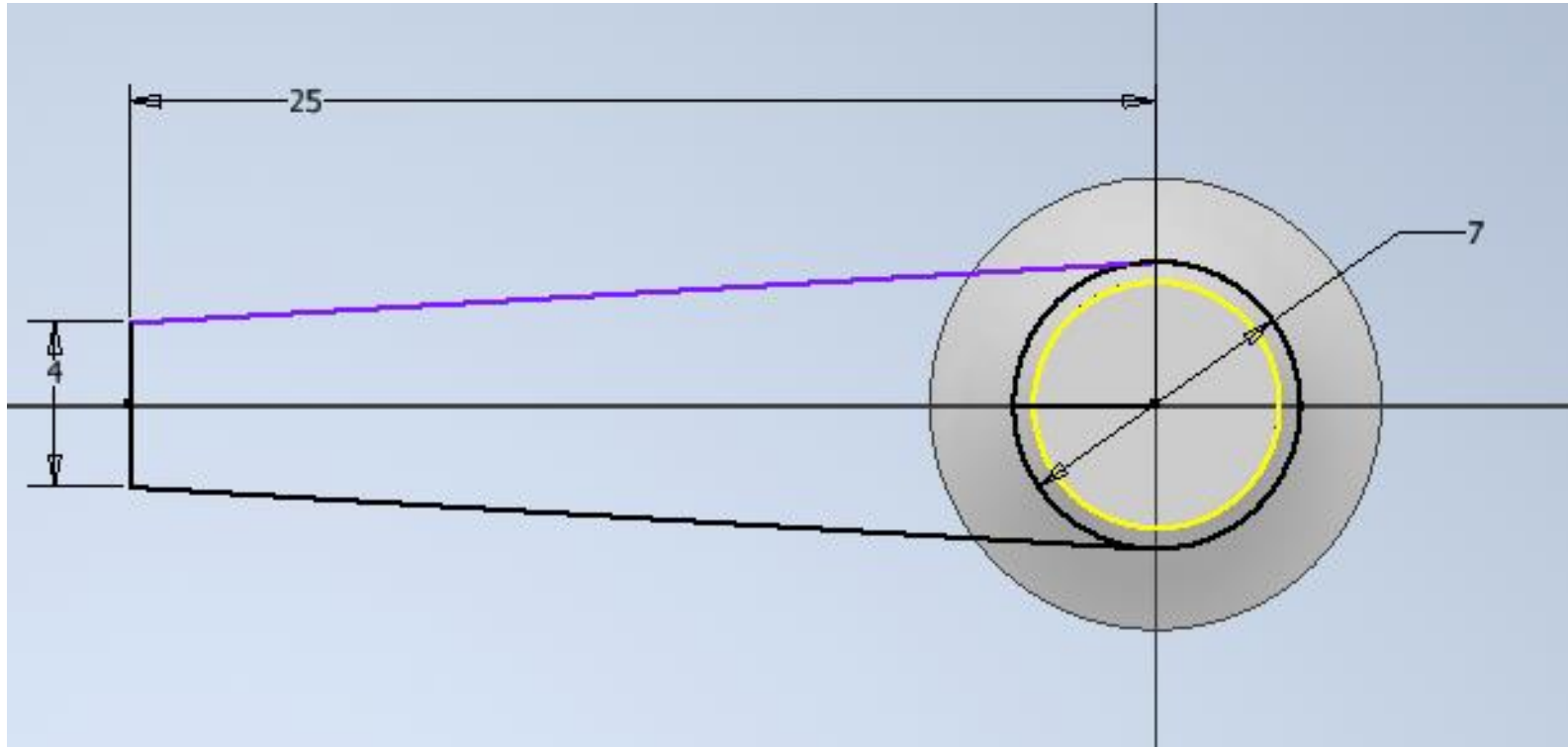
Open a new metric part, **sketch** the profile shown using **line** and **arc**. **Revolve** 360 degrees along the axis shown.



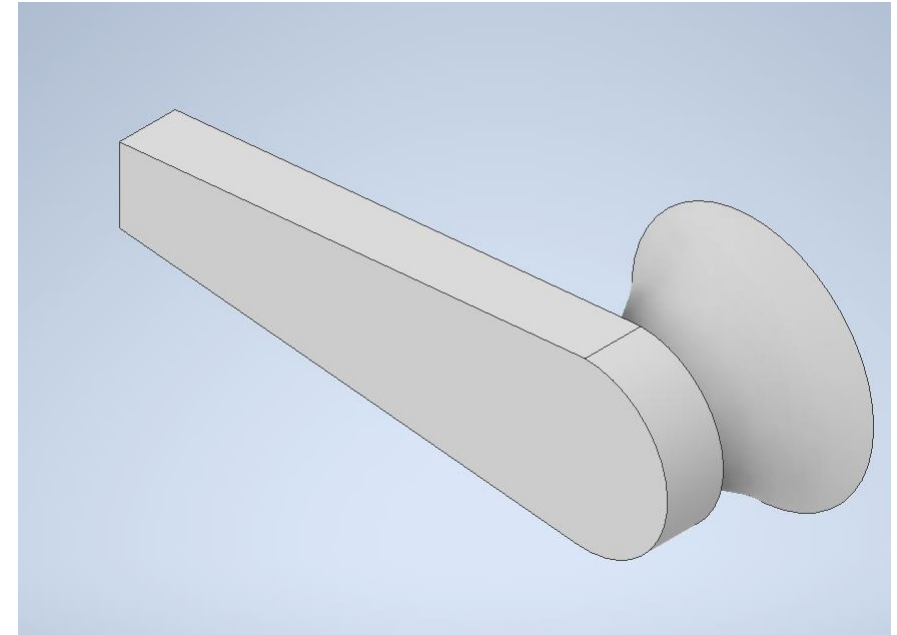
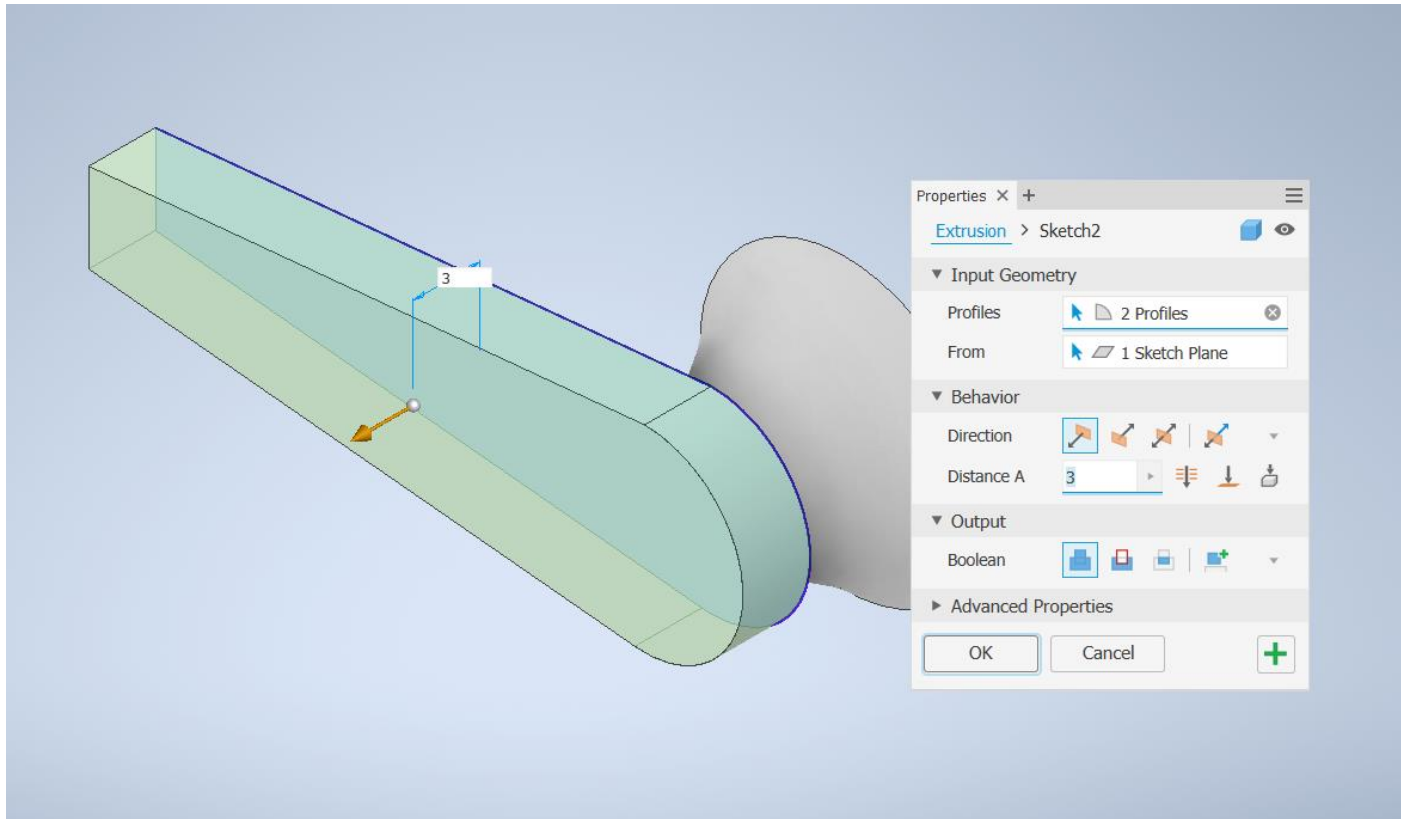
Place a **sketch** on the back as shown.



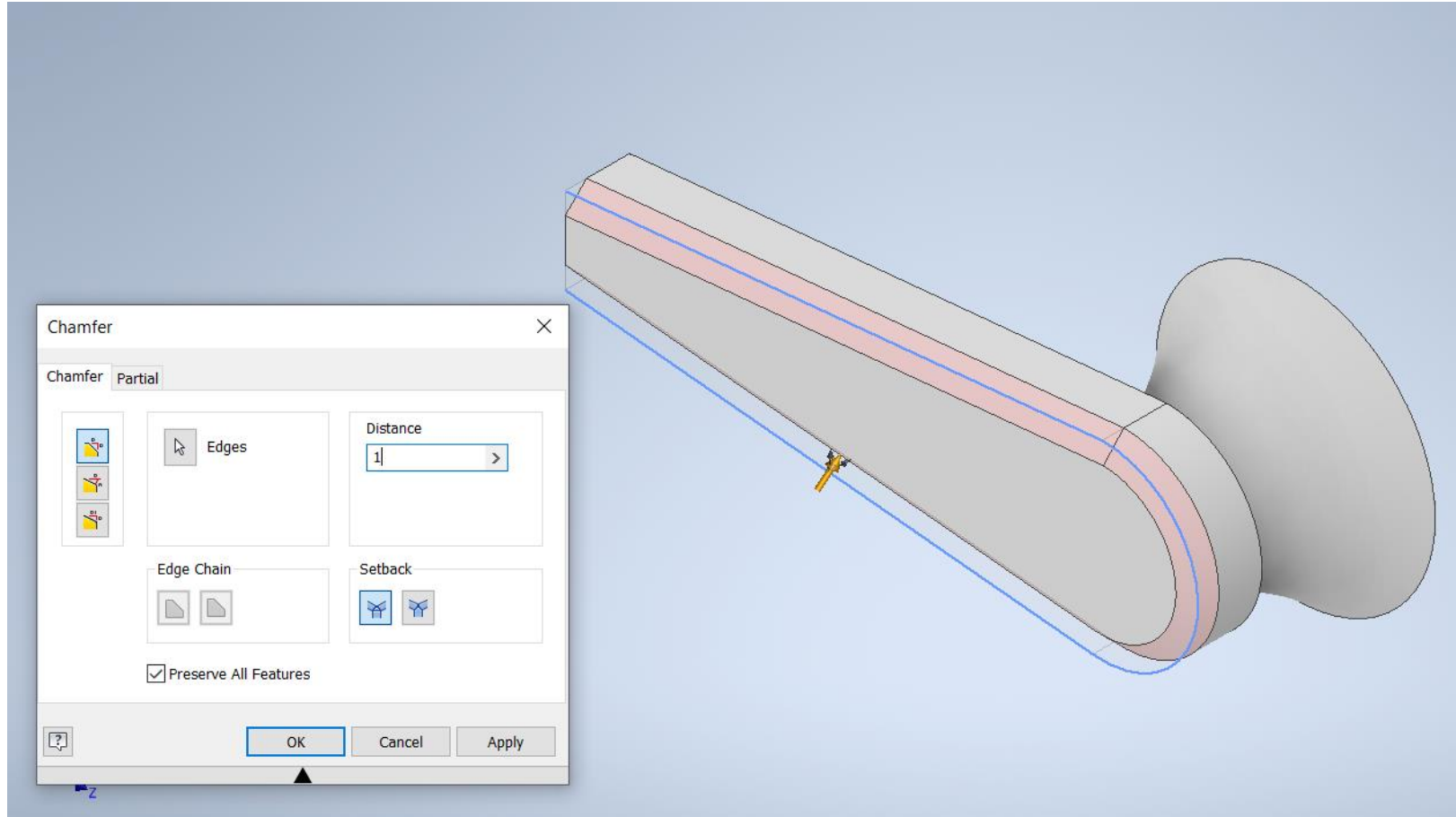
Sketch the profile shown, trim the unwanted lines.



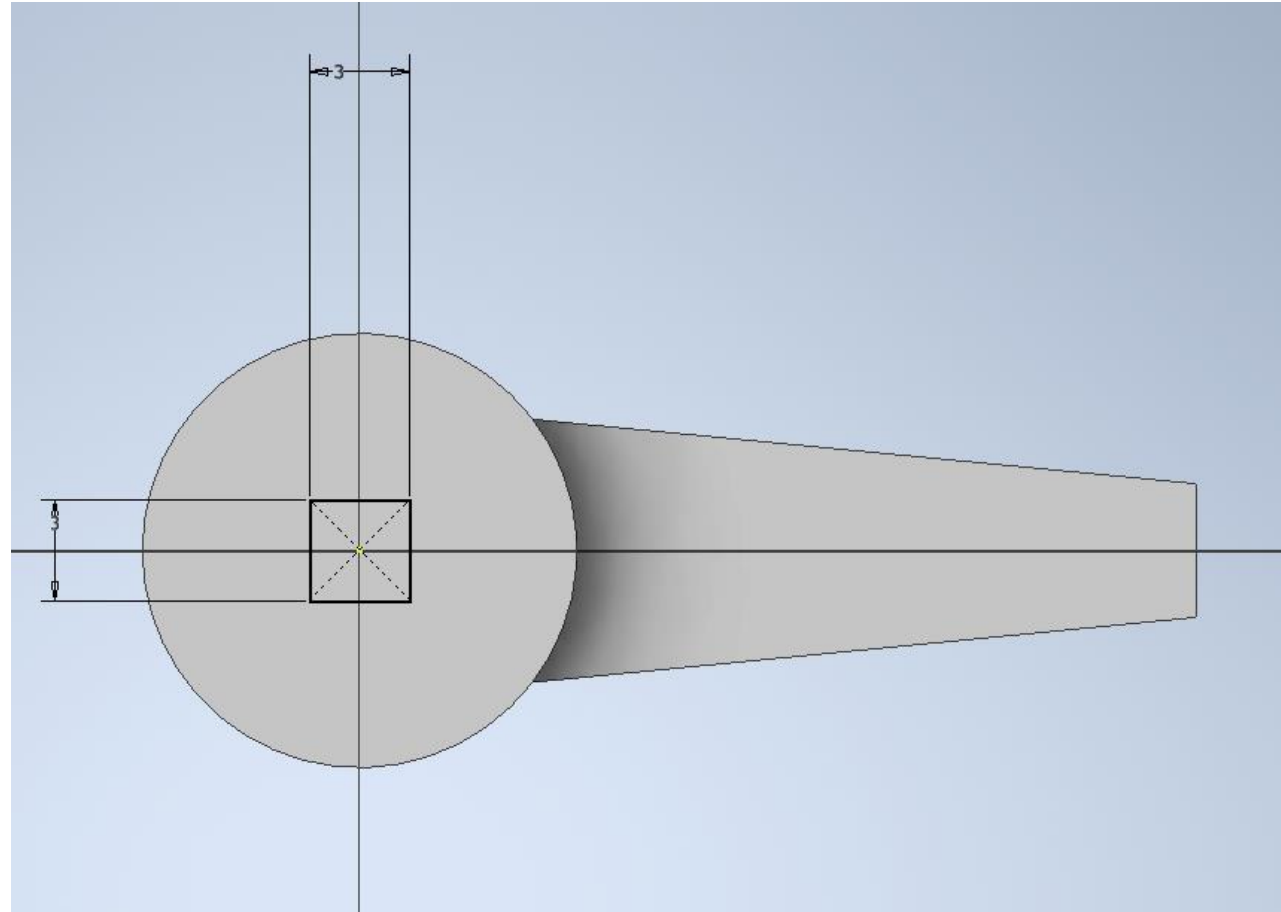
Extrude for 3mm



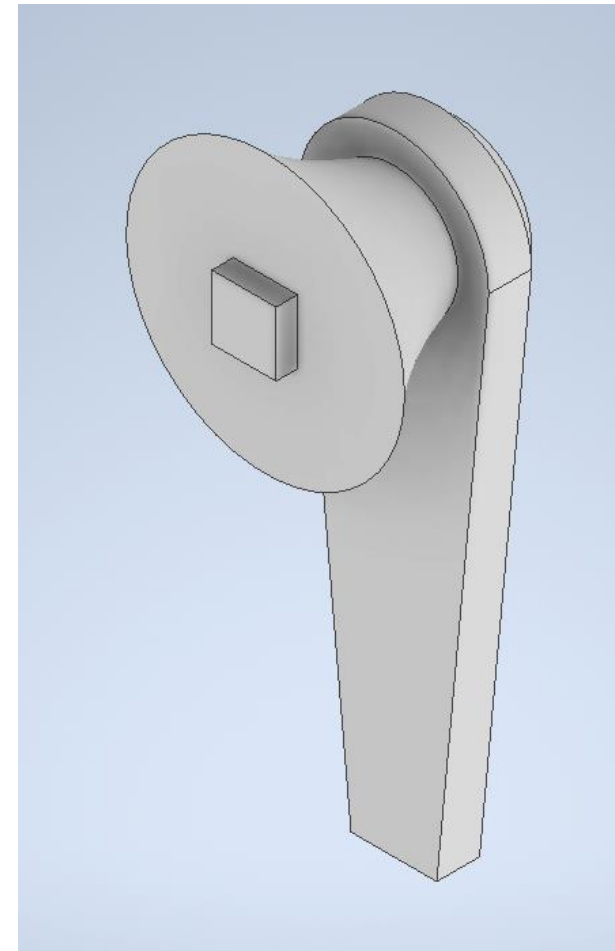
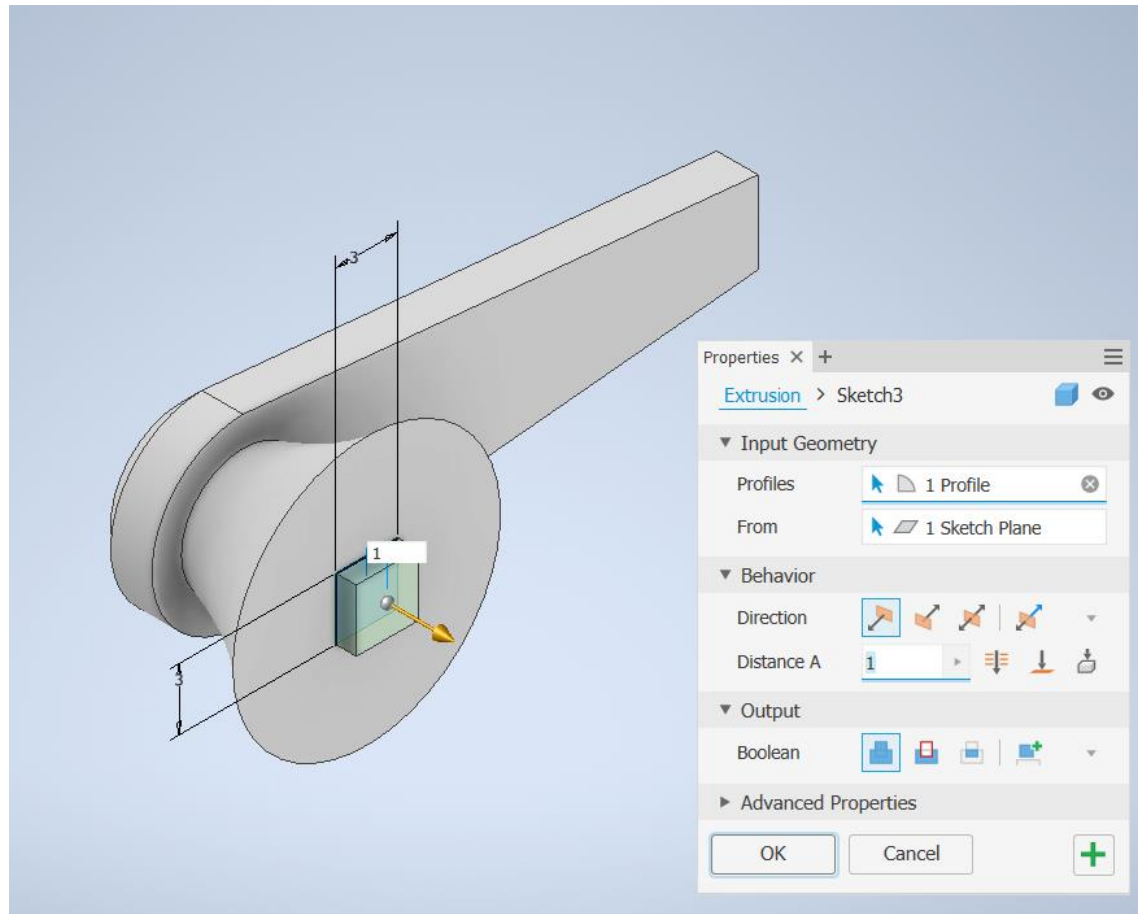
Chamfer as shown 1mm @ 45 degrees.



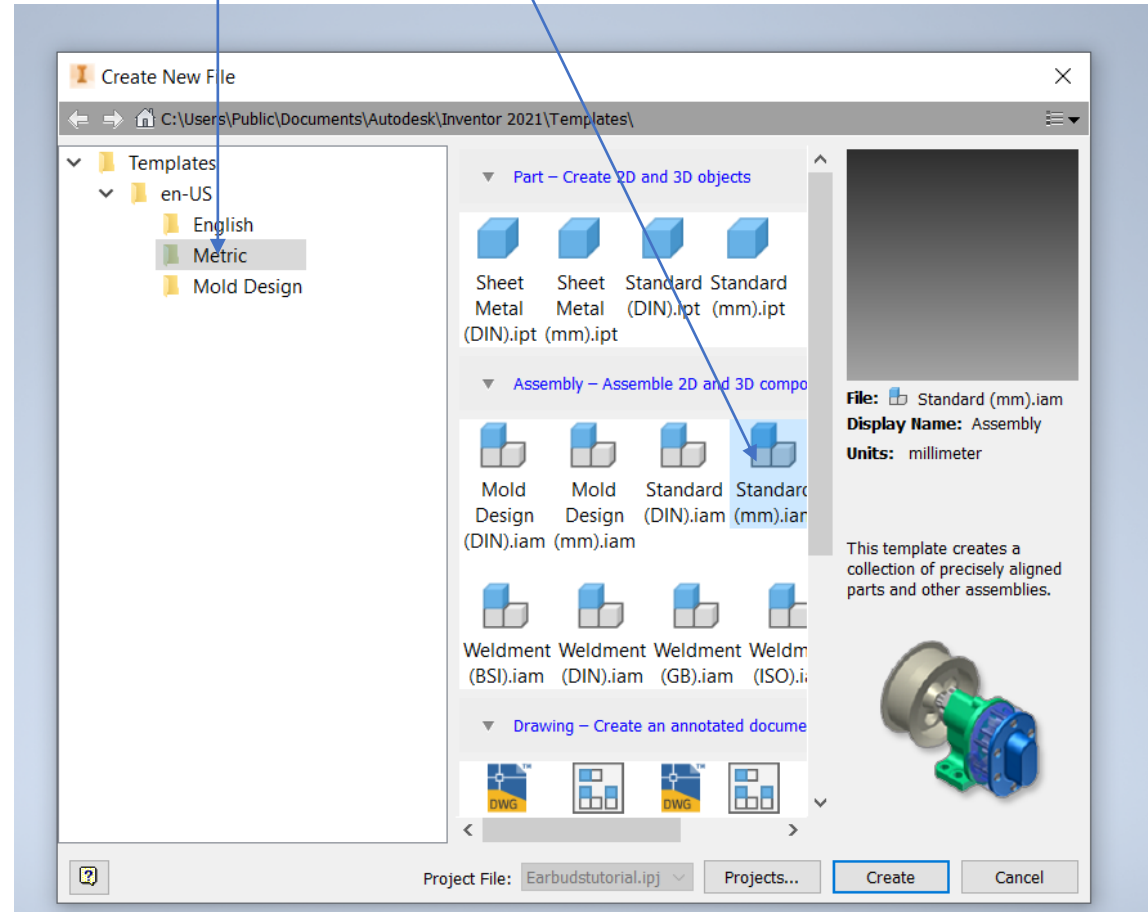
Place a **sketch** on the front face, use 2 point centre **rectangle** to sketch profile shown.



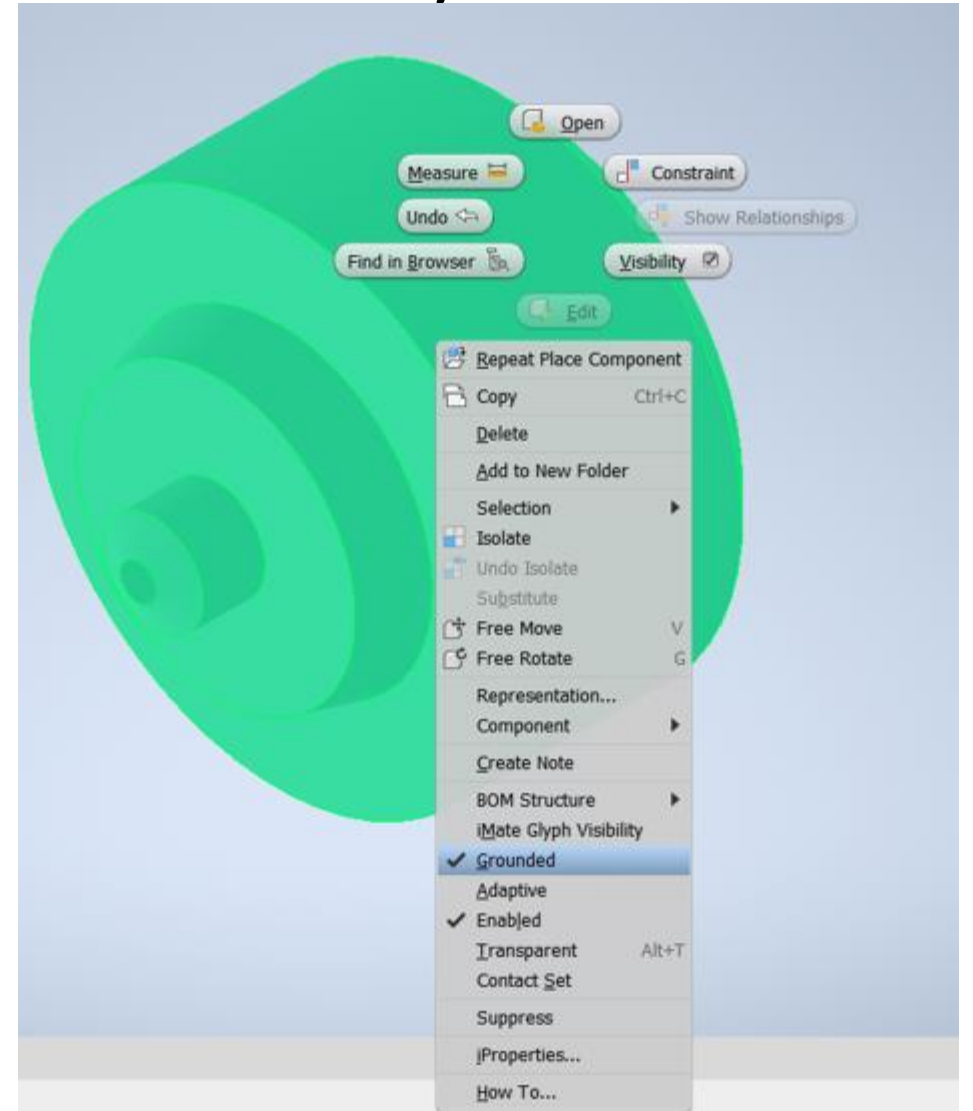
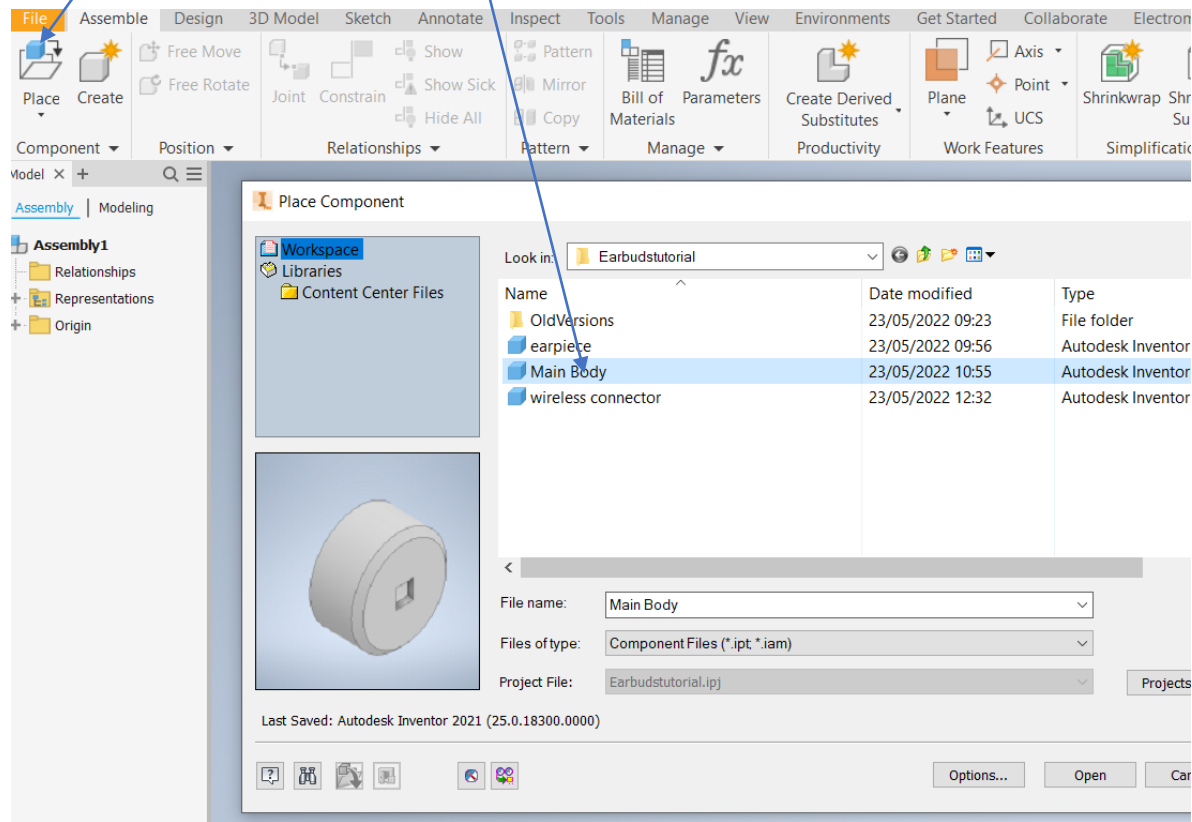
Extrude for 1mm, Save as wireless connector.



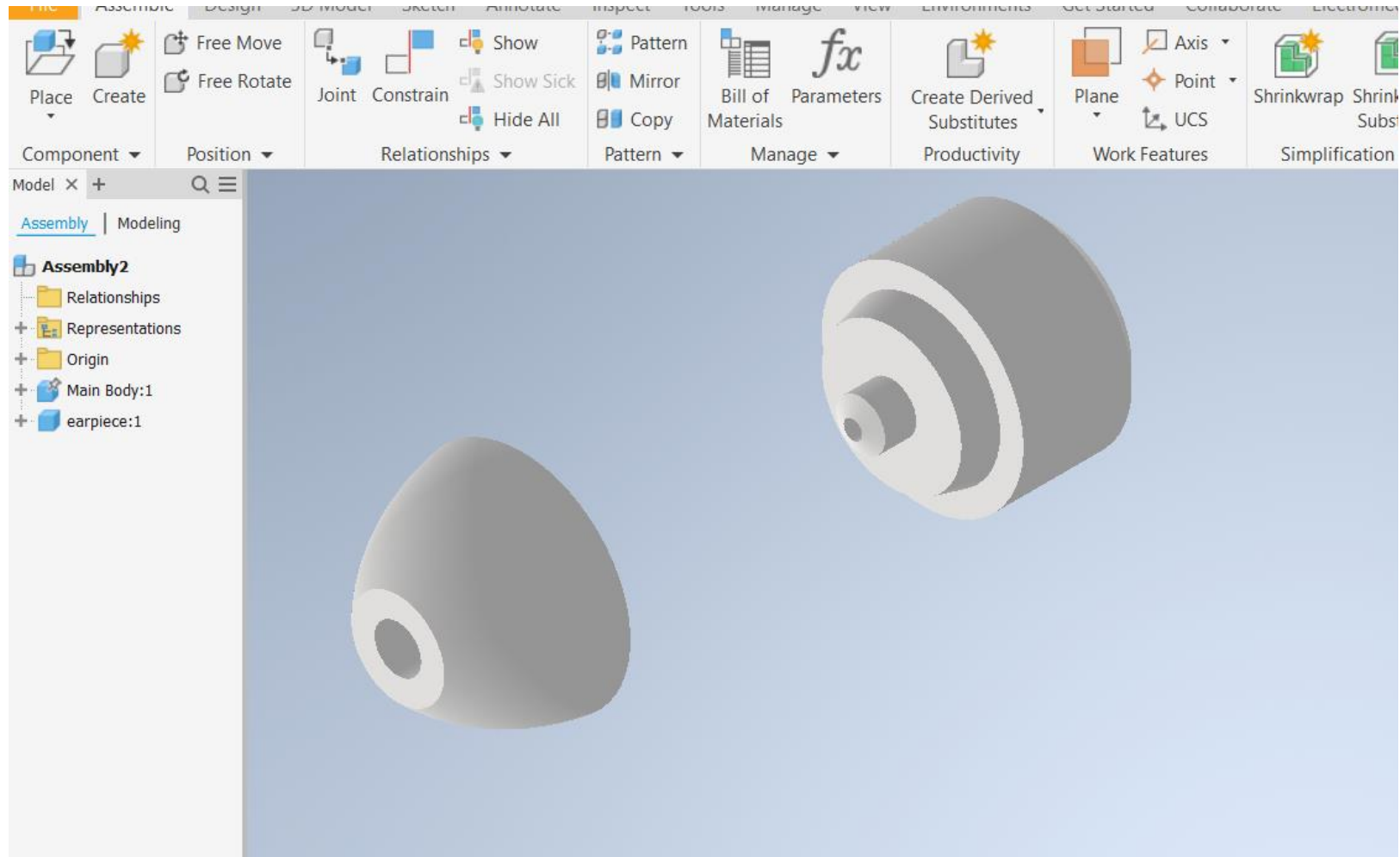
Create new metric assembly.



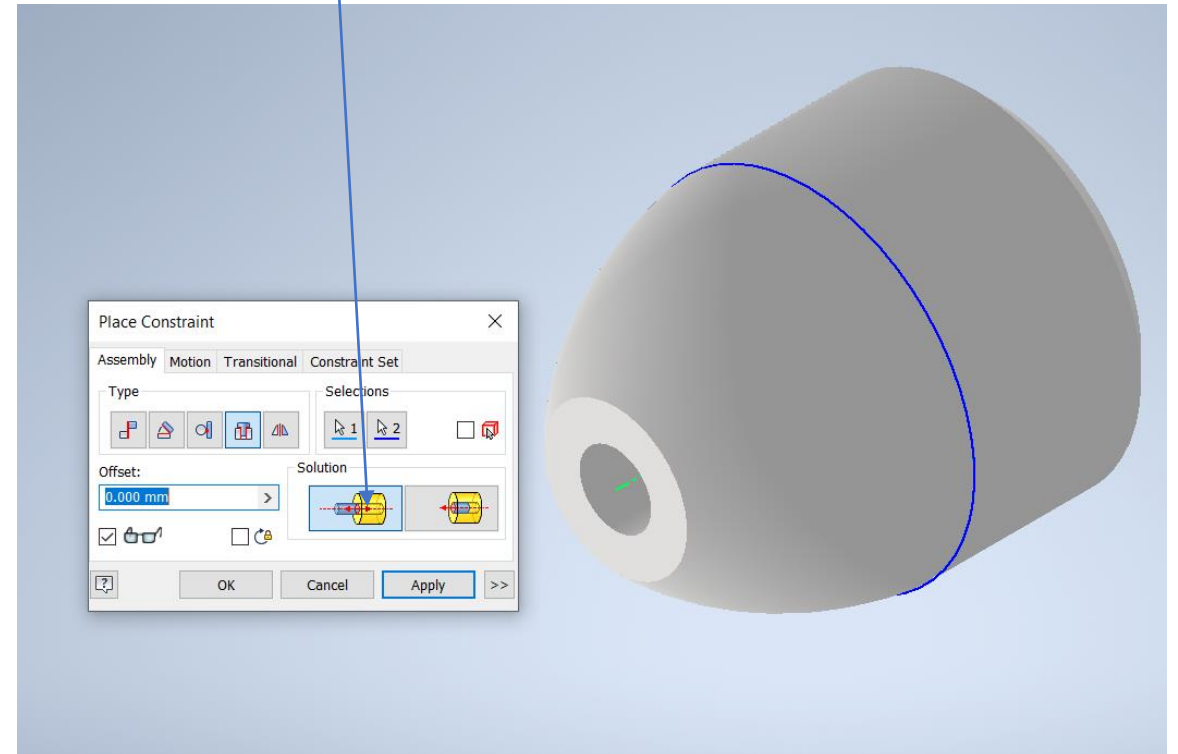
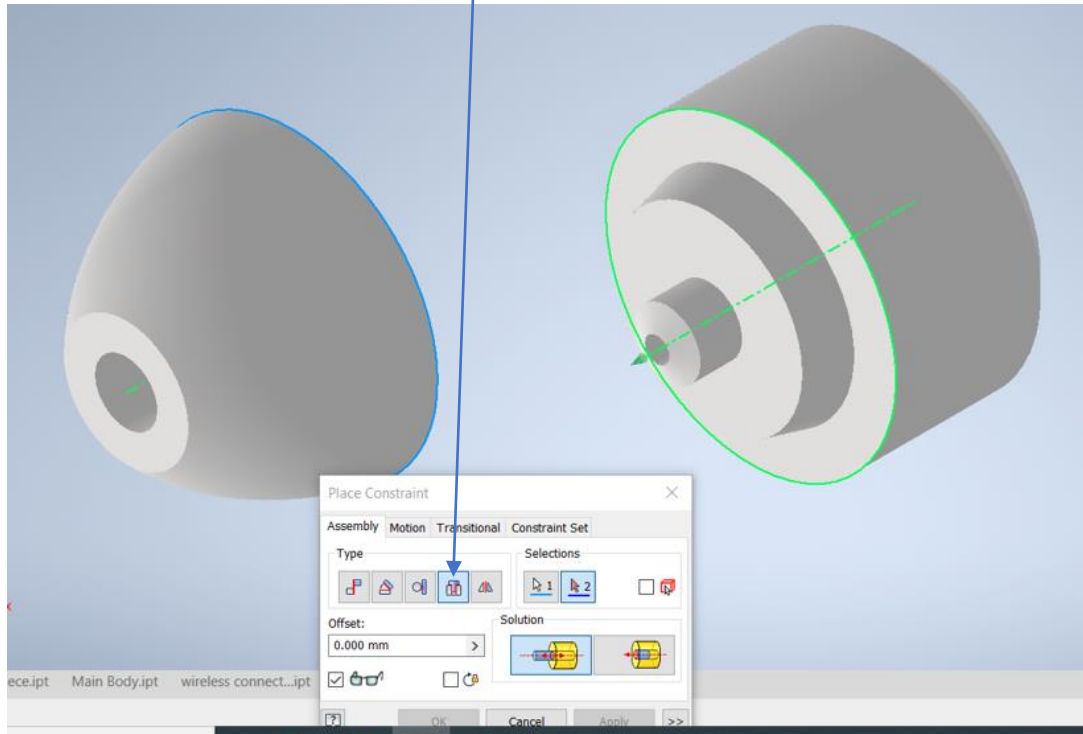
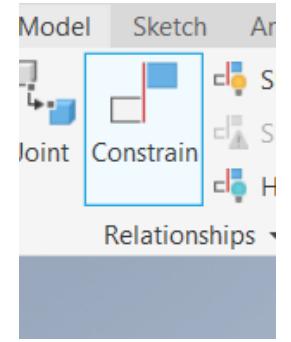
Place main body in assembly, right click and tick Grounded to fix it in the assembly



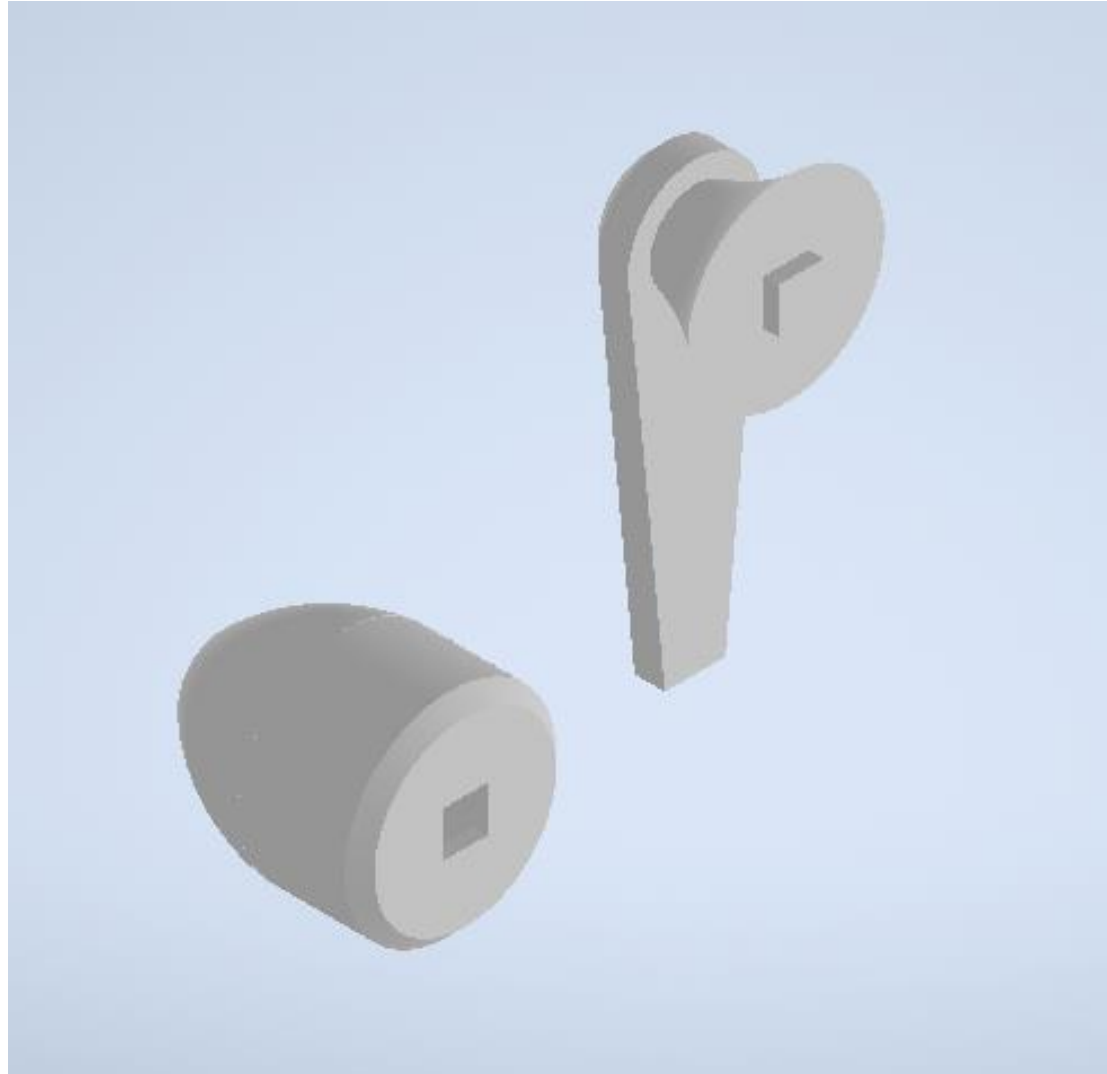
Place the earpiece in the assembly.



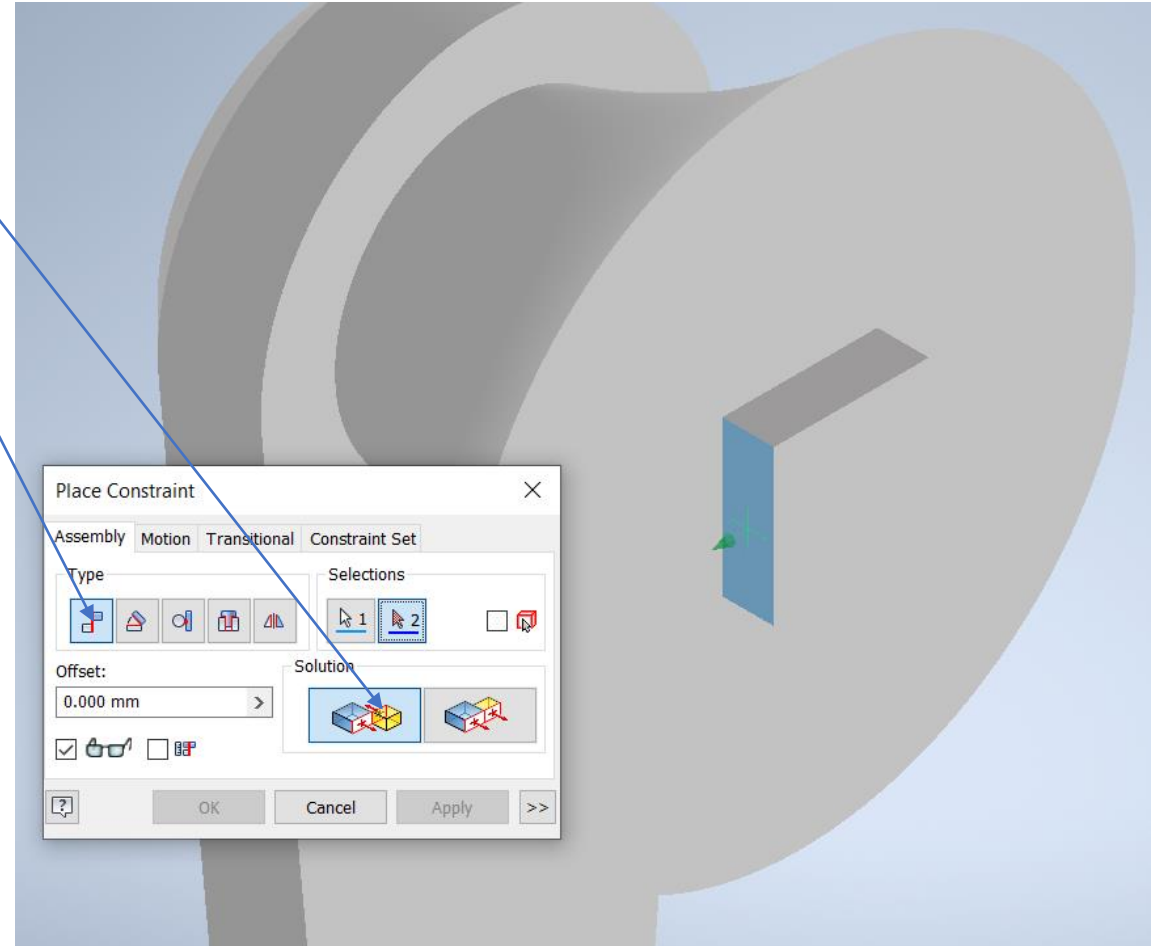
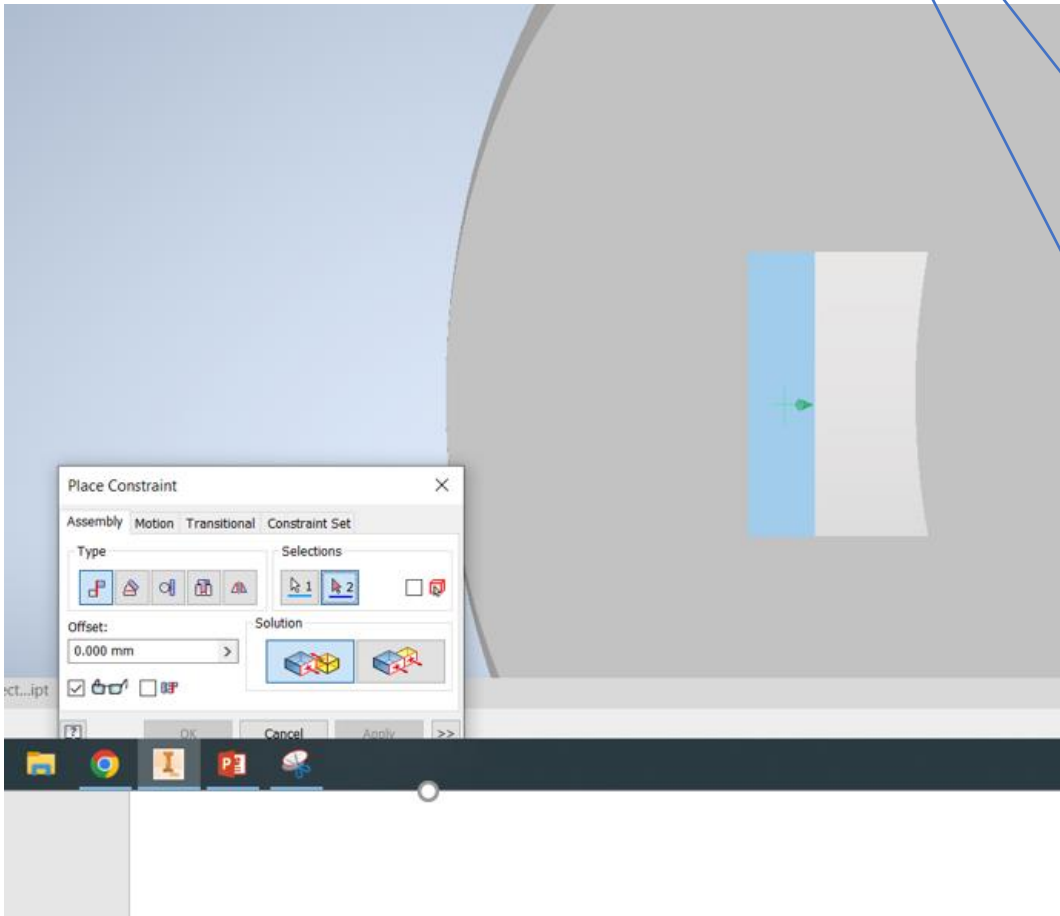
Use insert constrain to **align** with centre axis and **mate** to surface by selecting opposed.



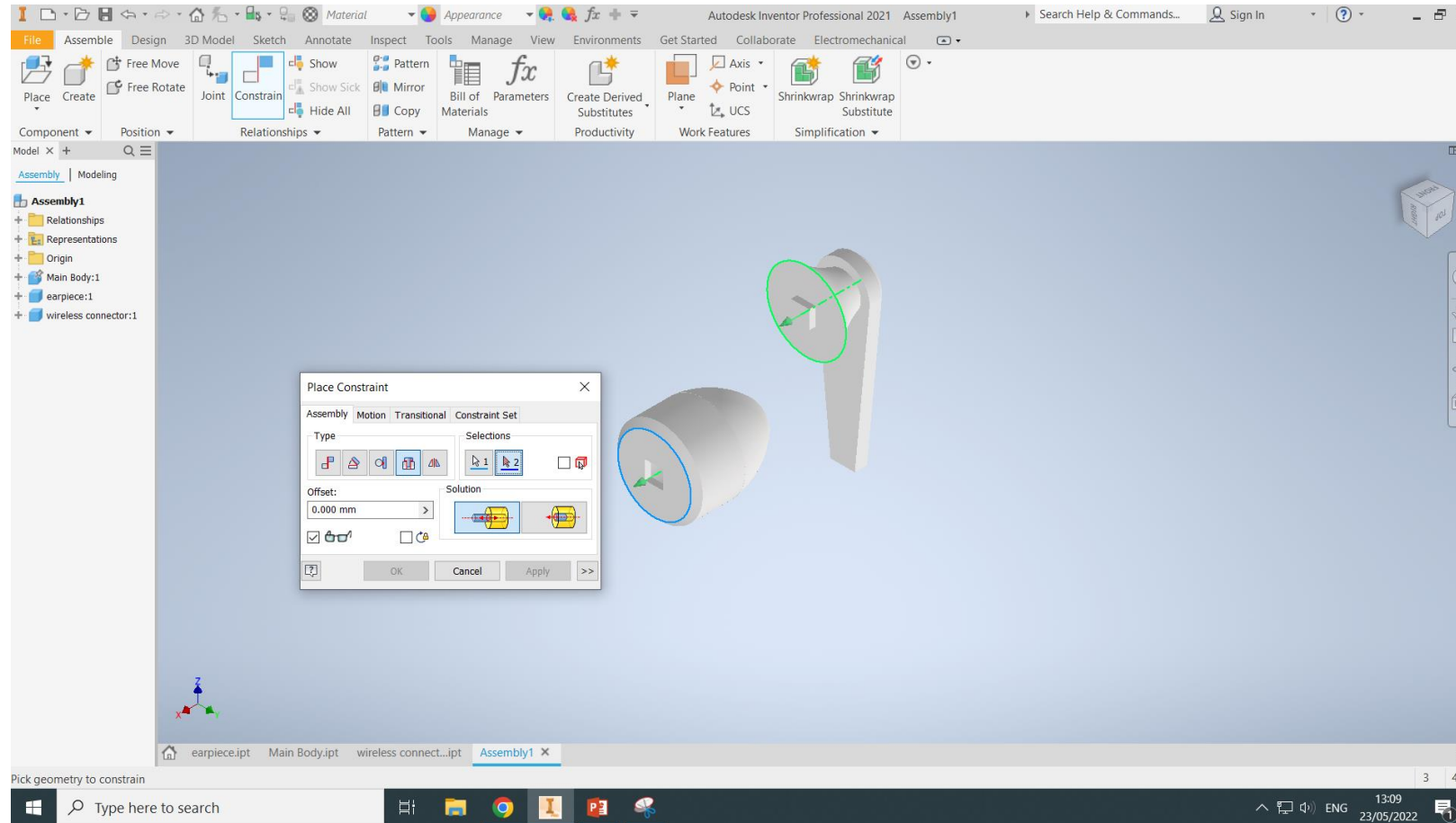
Place wireless connector into assembly.



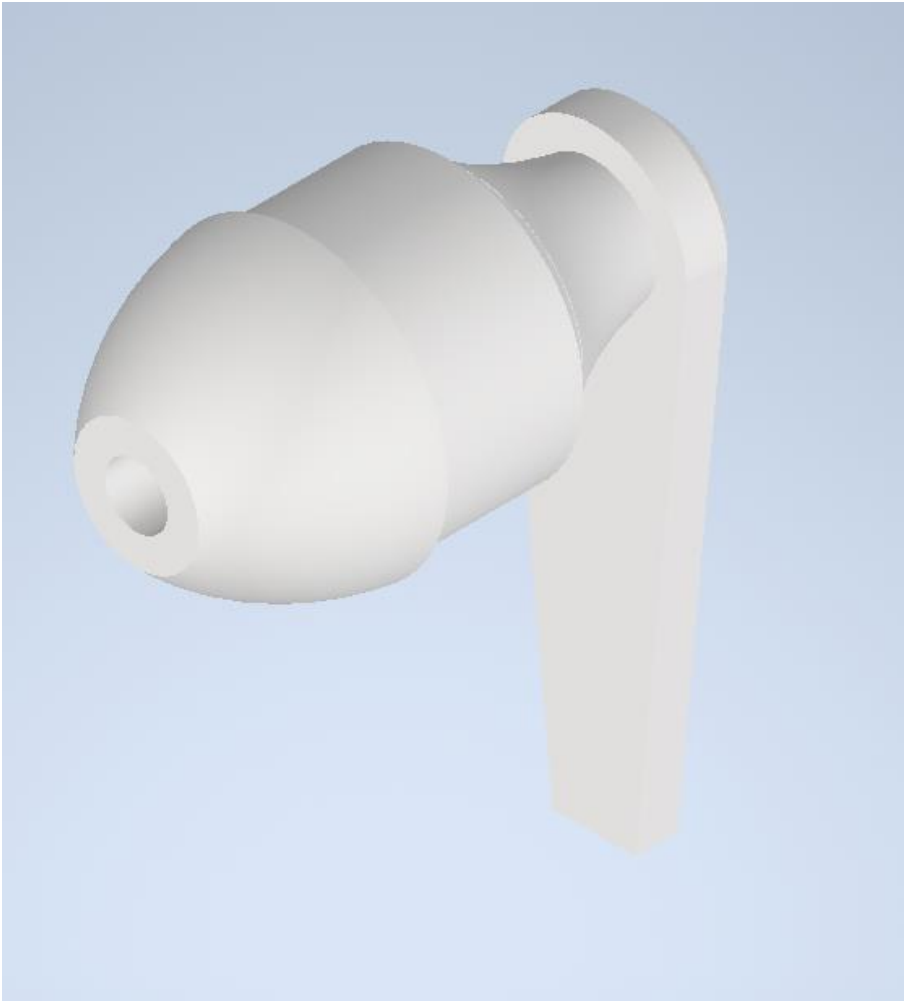
Use constraint **Mate** to oppose the surfaces shown



Use constraint, insert to **align** centre axis and **mate** by selecting opposed



Save as earbuds. Model complete.



1a Produce suitable component orthographic views of the three parts of one earbud. You must produce a plan, an elevation and an appropriate sectional end elevation for each of the following parts:

- ◆ the earpiece
- ◆ the main body
- ◆ the wireless connector

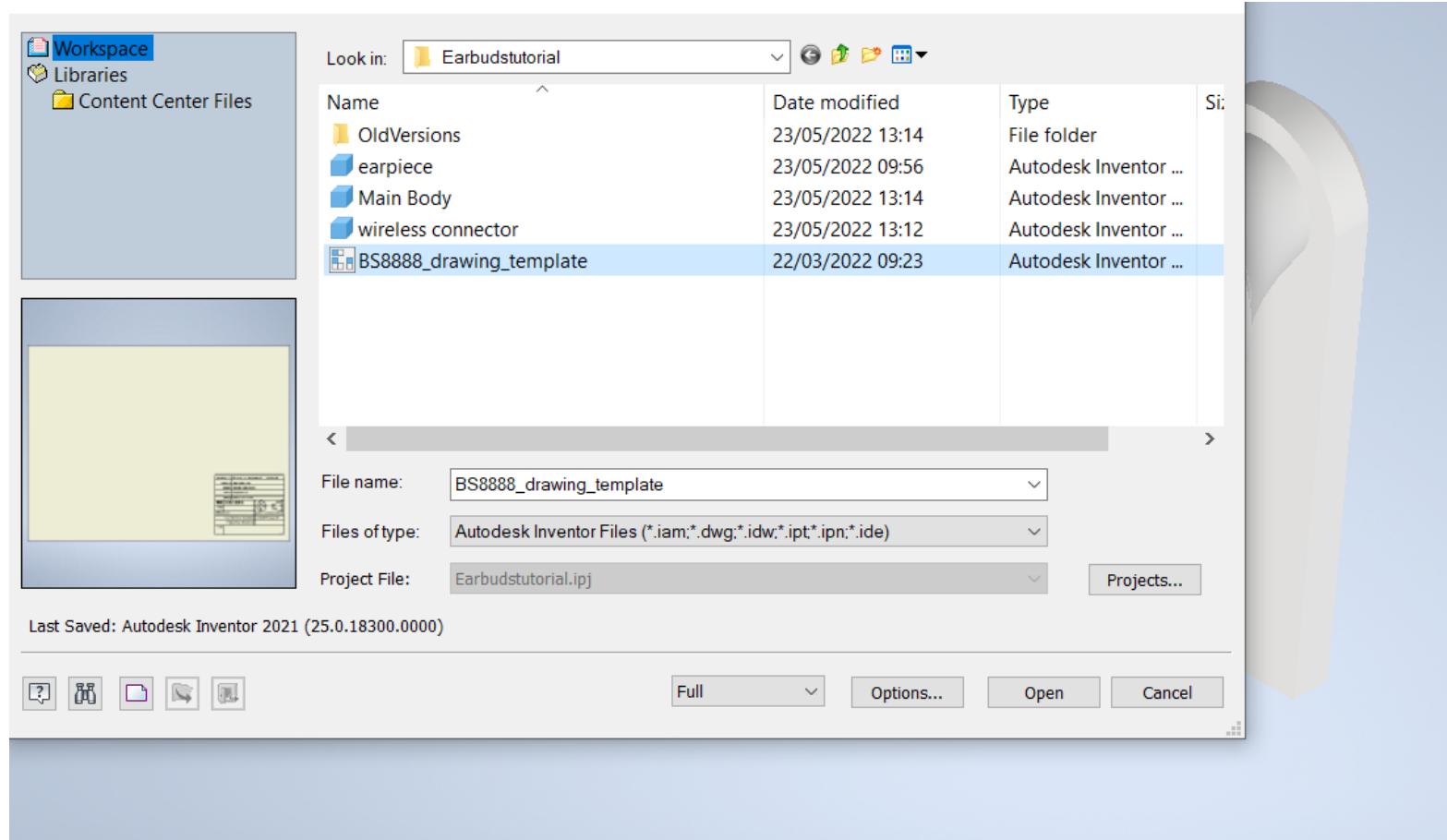
You must show all views for the three components, complete with appropriate dimensioning, annotations and to a suitable scale.

You must produce views in the same orientation as each individual data sheet.

You must use third-angle projection and show all hidden detail except in the sectional views.

(5 marks)

Copy the drawing template into your project folder, then open it.



In the file tab select i-properties to open the title box. Input your information in the summary section.

The image shows the Autodesk Inventor Professional 2021 interface. The 'File' menu is open, and the 'iProperties' option is selected. The 'Drawing_Template iProperties' dialog box is open, showing the 'Summary' tab. The dialog box contains the following information:

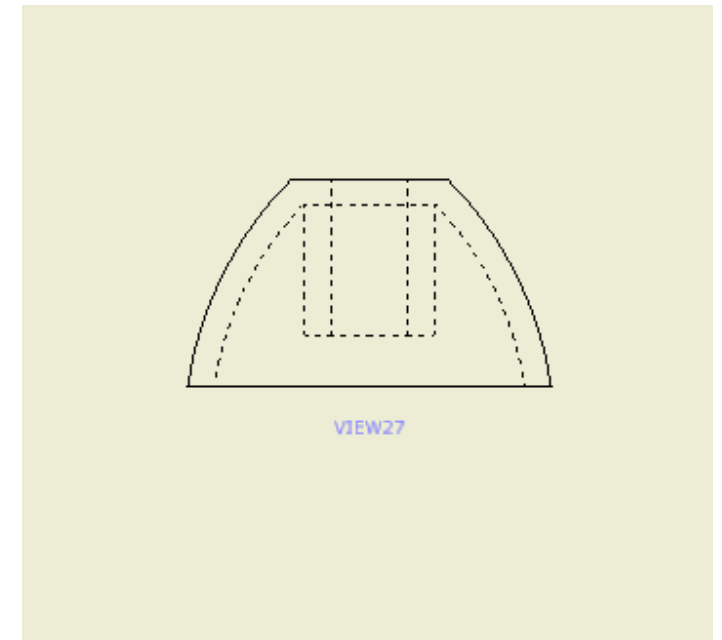
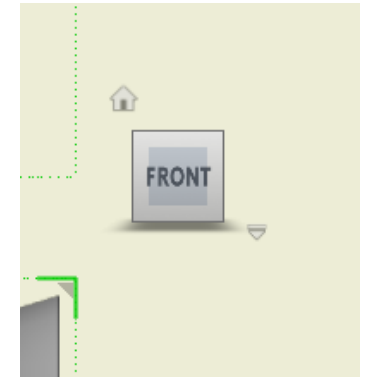
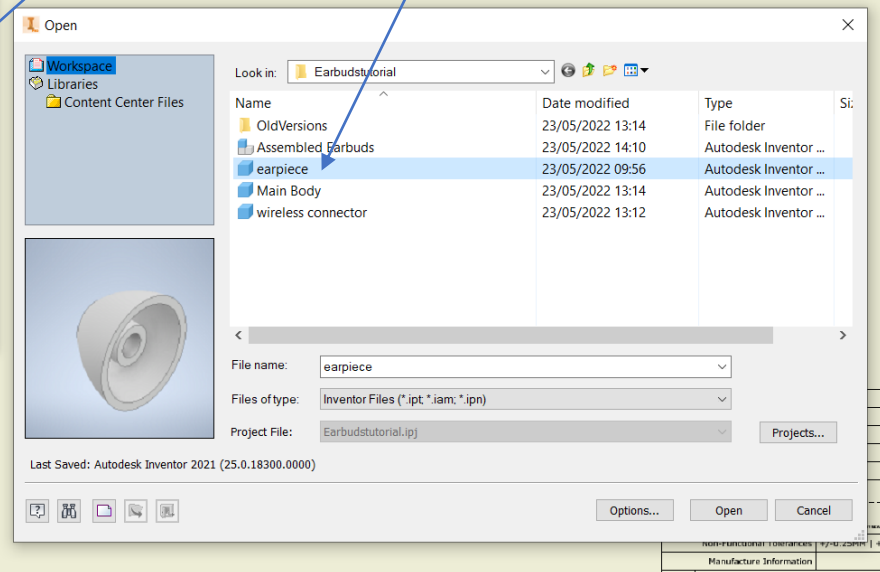
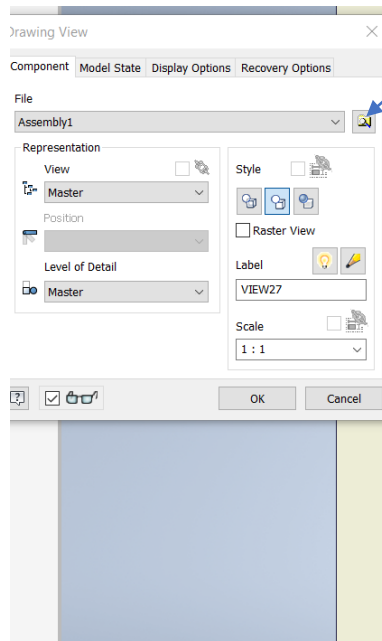
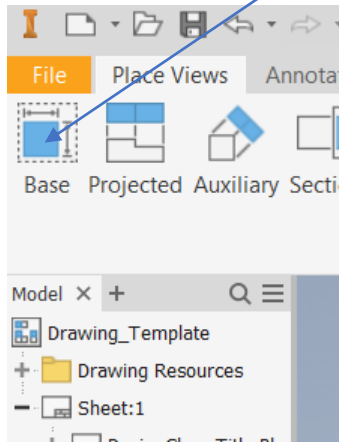
Title:	Earbuds Project
Subject:	Graphic Communication N5
Author:	Mr Douglas
Manager:	
Company:	Springburn Academy
Category:	+/-0.25MM +/-0.1°
Keywords:	
Comments:	

At the bottom of the dialog box, there is a 'Template:' section with a checkbox for 'Save preview picture' which is currently unchecked. The 'OK', 'Cancel', and 'Apply' buttons are visible at the bottom right of the dialog box.

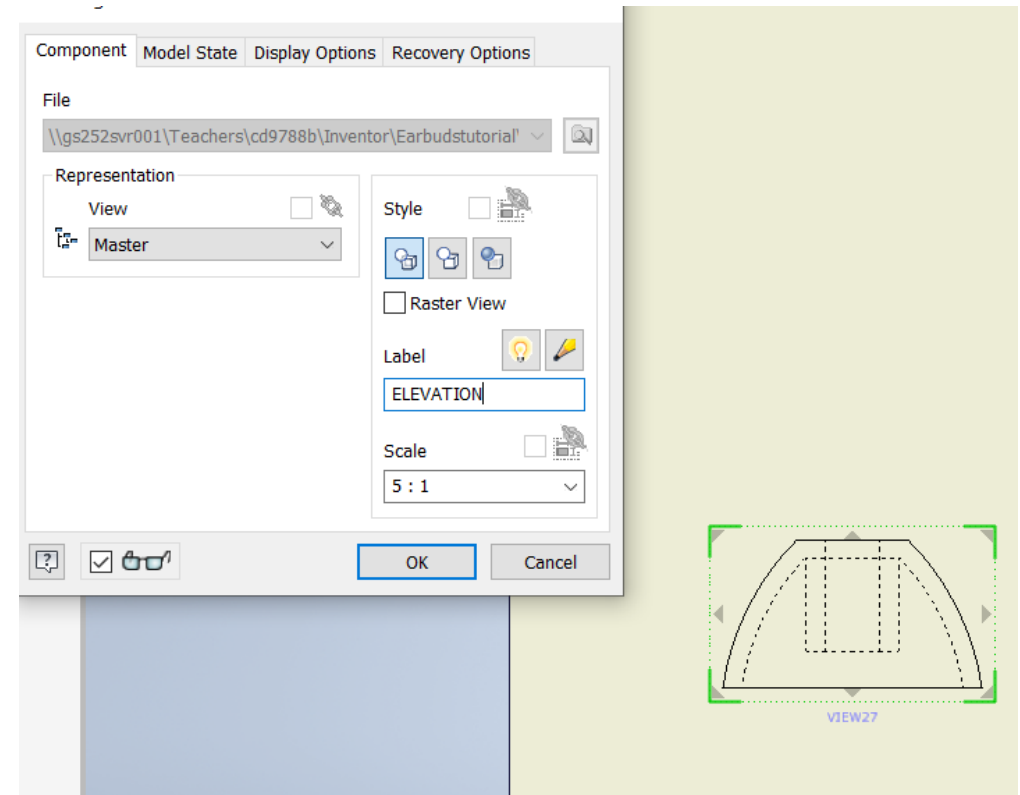
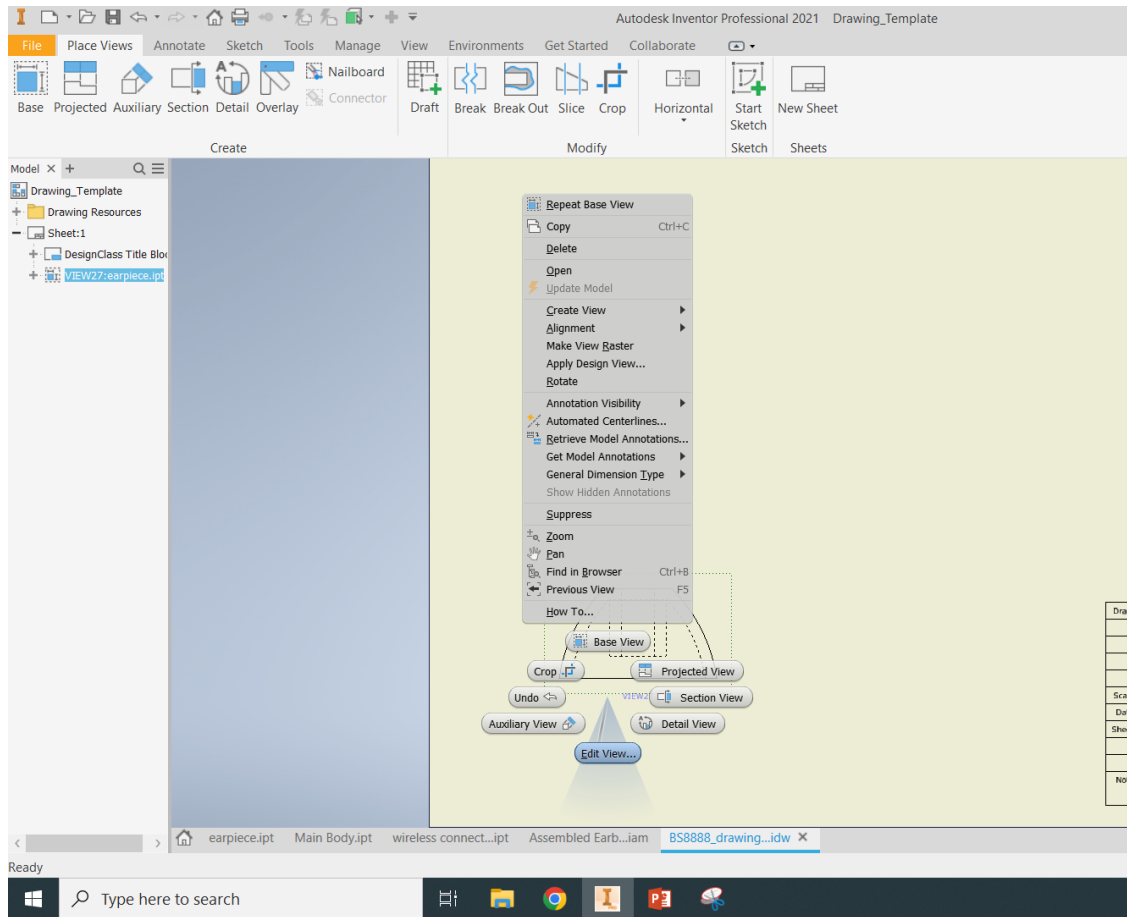
The background shows the Autodesk Inventor Professional 2021 interface with the 'File' menu open, displaying options like 'New', 'Open', 'Save', 'Export', 'Share', 'Manage', 'iProperties', 'Print', and 'Close'. The 'iProperties' option is highlighted. The main workspace shows a drawing template with a title block and a drawing area. The title block contains the following information:

Drawing Title	Go to File > iProperties to fill in this block.
Drawn By	Your name here
Teacher	Teacher name here!
Course	Subject here!
School	School name here!
Scale	(unless specified)
Date	
Sheet	1 / 1
Non-Functional Tolerances	+/-0.25MM +/-0.1°
Manufacture Information	
Note	

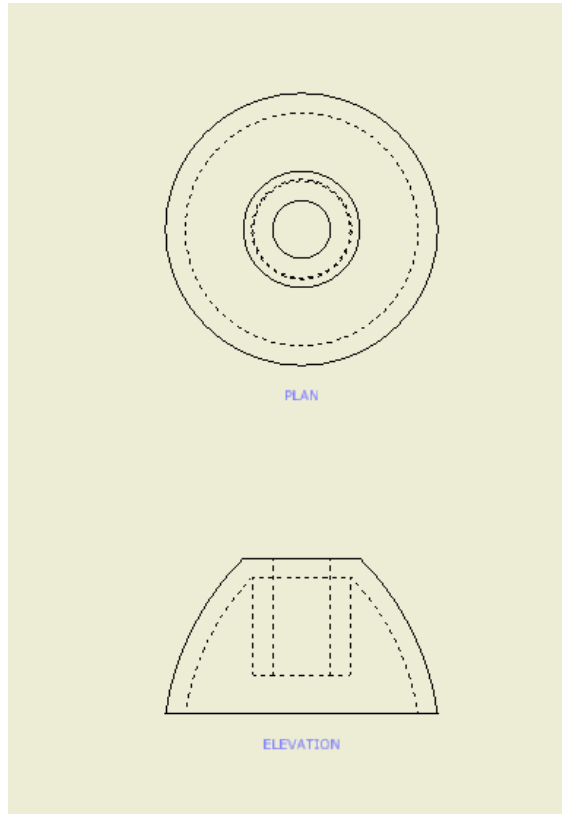
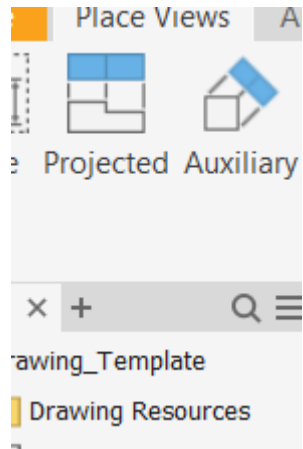
Select Base View and select earpiece orientate as shown using the navigation cube



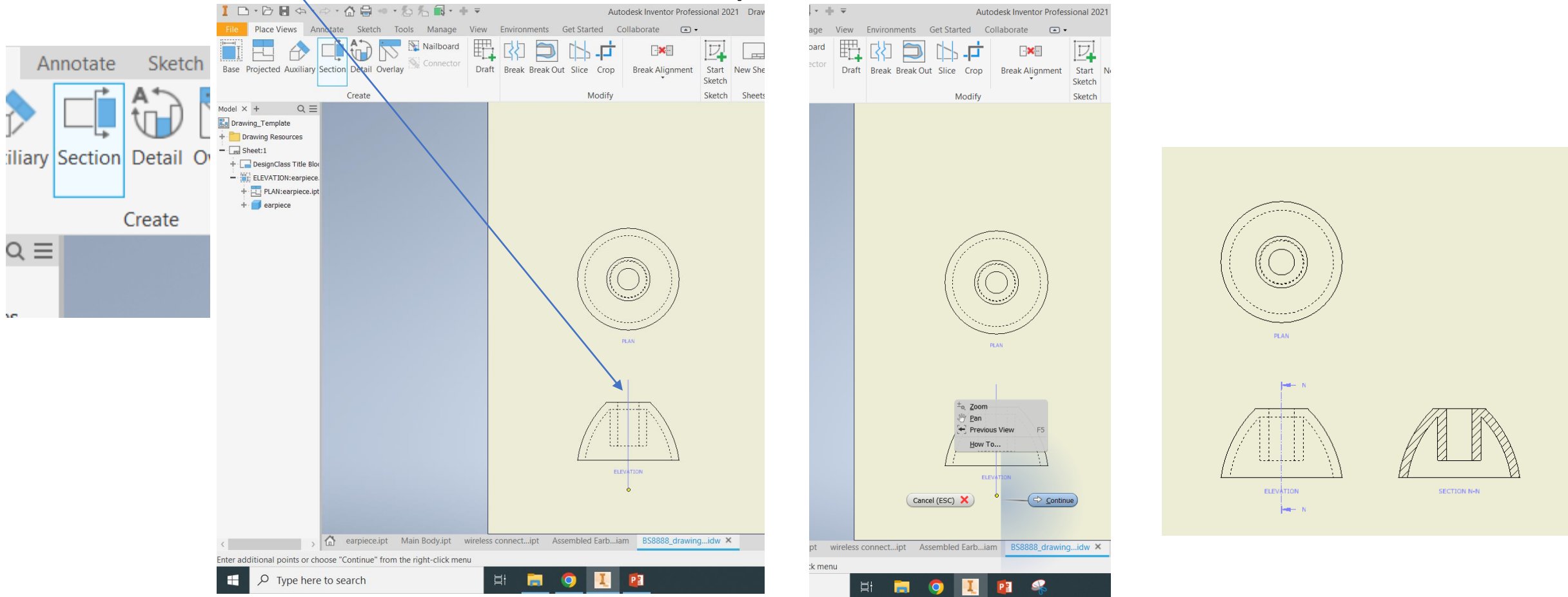
Right Click on the view to edit view, In the label box enter ELEVATION chose a scale.



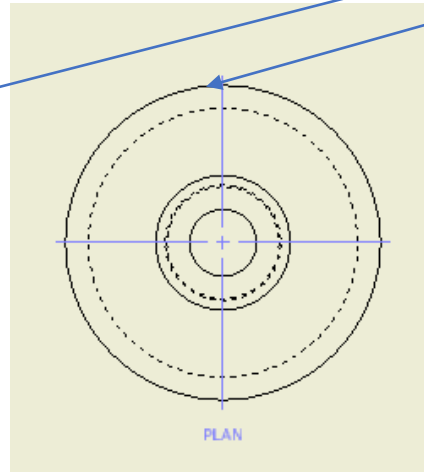
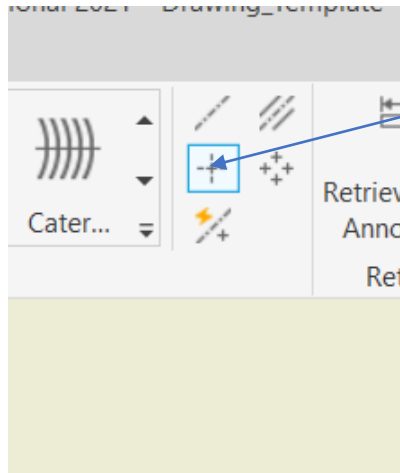
Use projected to project the plan from the elevation, label as PLAN.



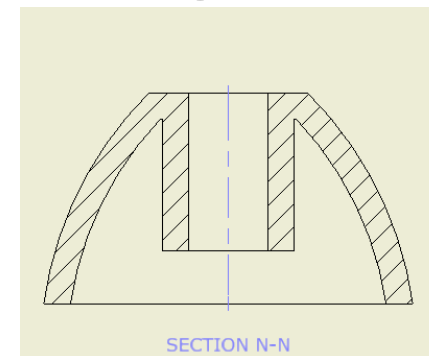
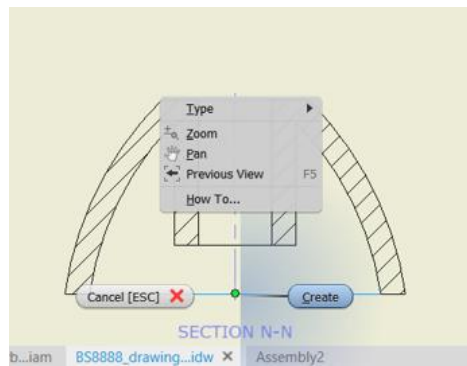
Use Section to produce the sectional view click then draw a line through the vertical centre of the elevation, well clear of the view, right click and select continue, click to place.



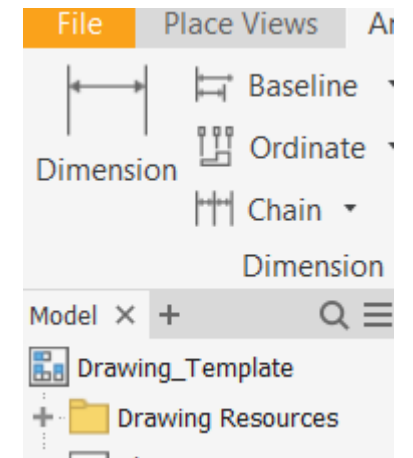
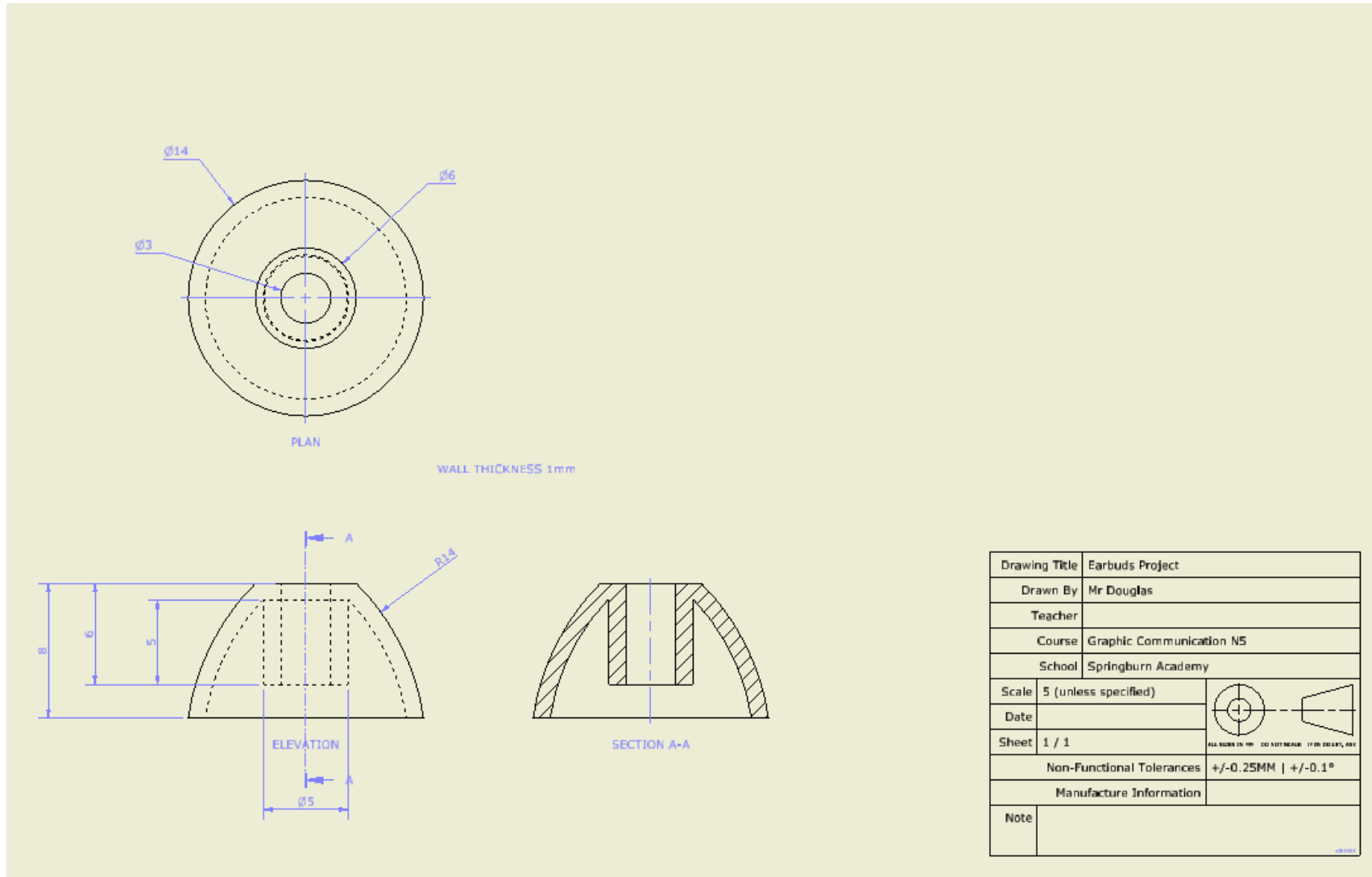
Annotate, dimensions and centre lines. Use centre mark tool to apply centre lines to all circles shown, click on the outermost circle to apply



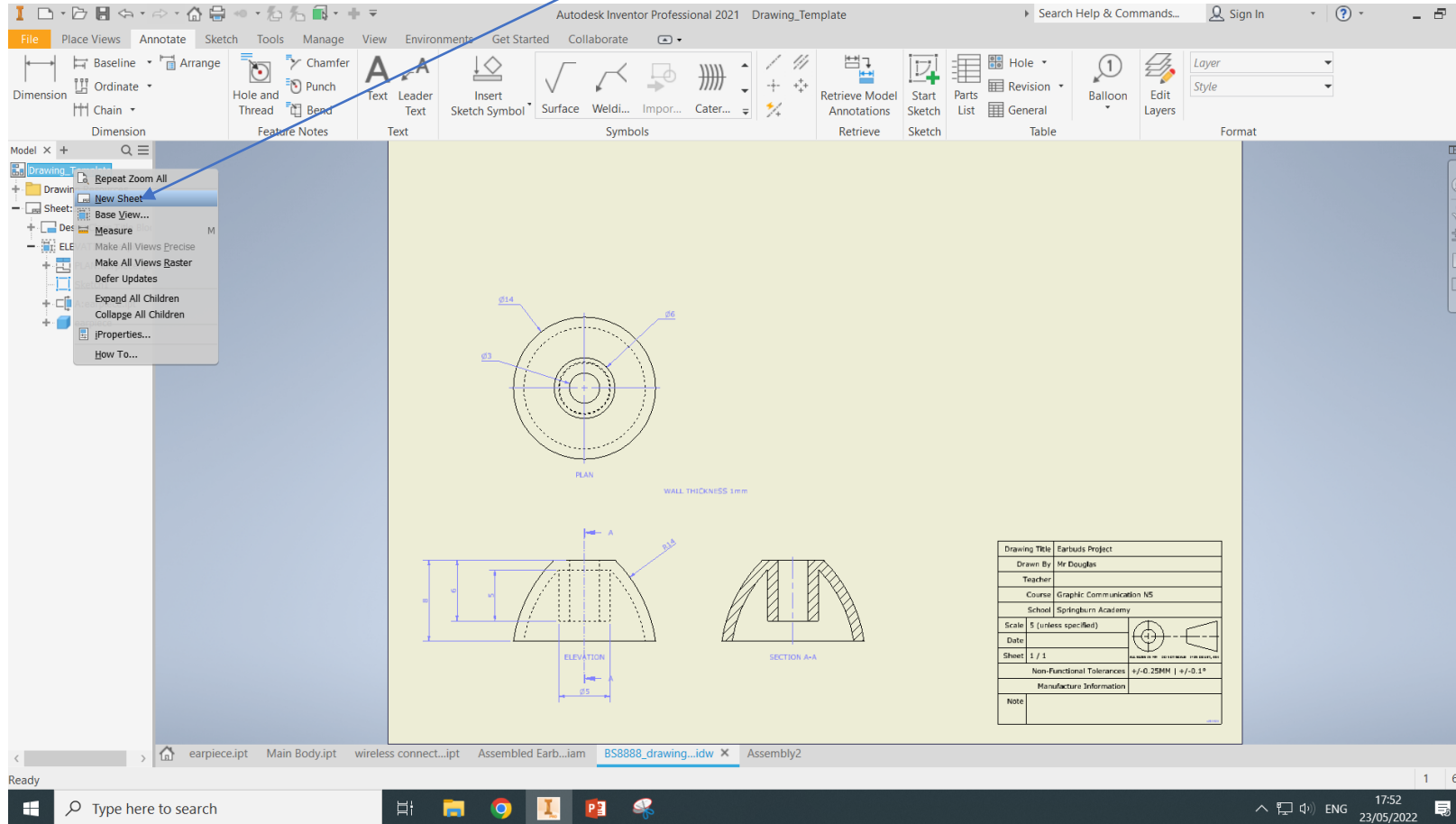
Use centre line to apply centre lines to verticals select the centre of both lines then right click create



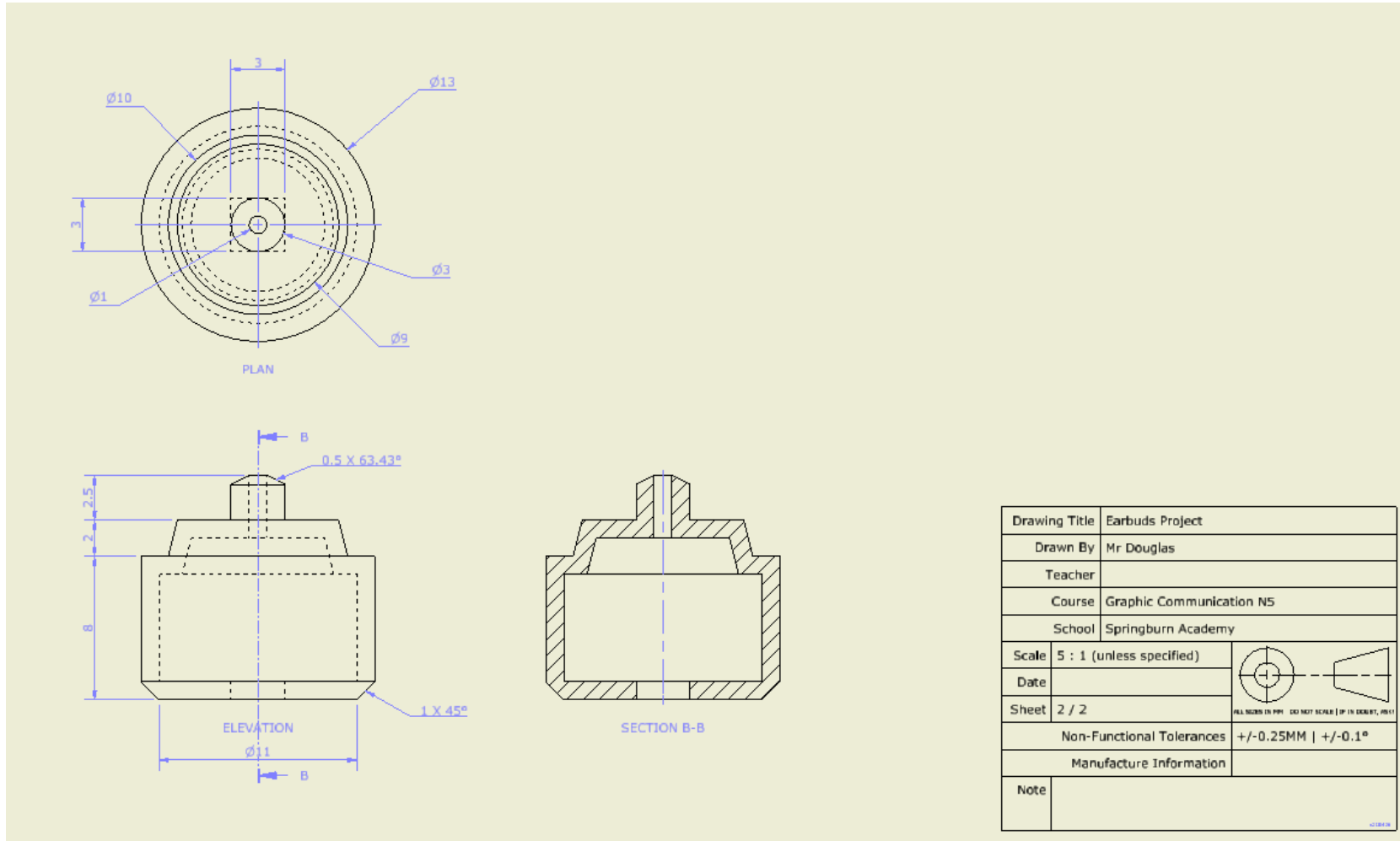
Annotate as shown using the dimension tool.



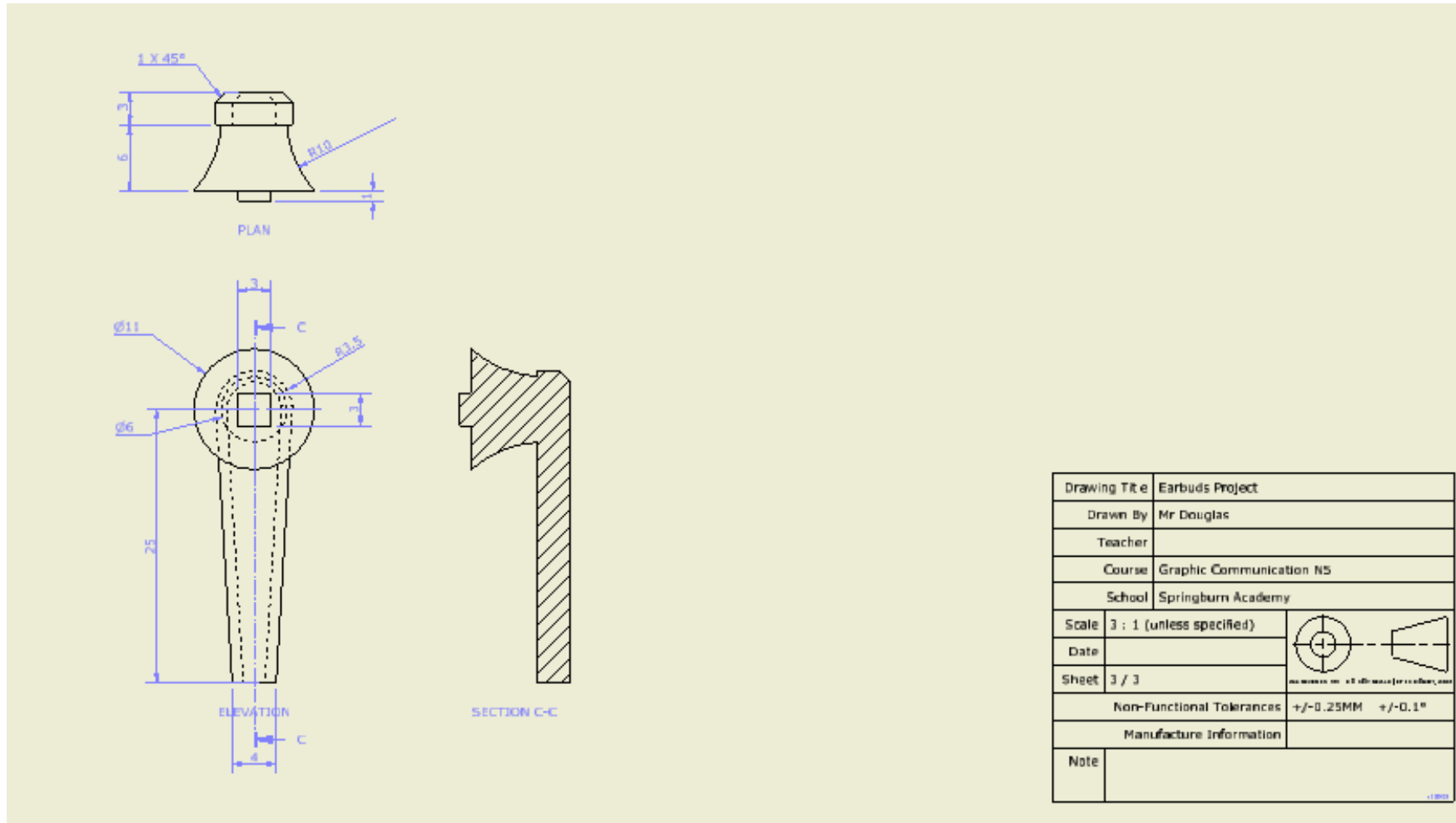
Open a second sheet by right clicking on the title and selecting New Sheet



Follow the same procedure and produce the drawing as shown



Follow the same procedure and produce the drawing as shown



1b Produce a plan, elevation and a sectional end elevation of the assembled earbud to a suitable scale.

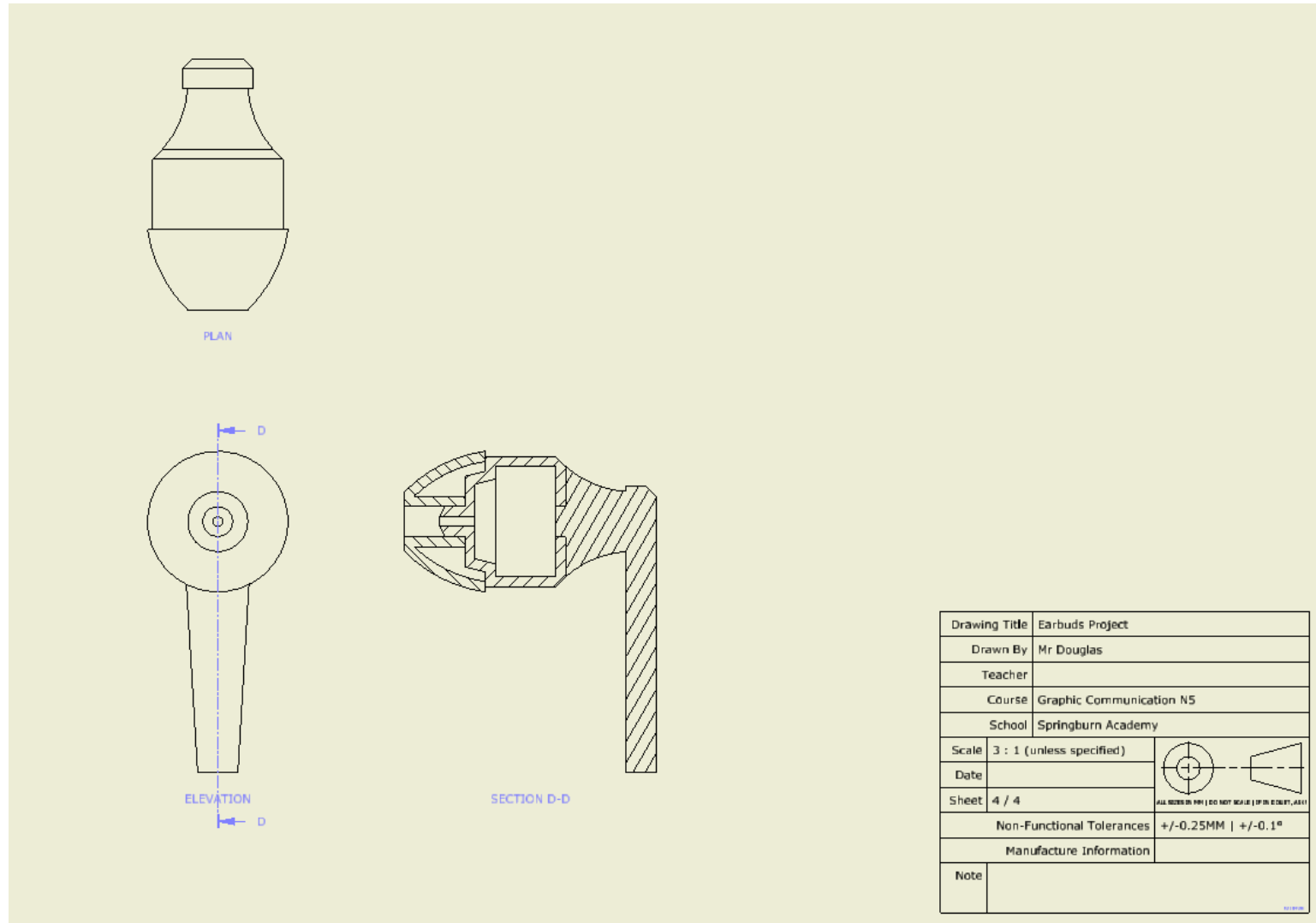
You must produce these as line drawings, using third-angle projection and they must not show hidden detail.

You must produce views in the same orientation as data sheet 1c.

The sectional end elevation should cut through all three components, in order to show the wall thickness of the earpiece component.

(3 marks)

Follow the same procedure and produce the drawing as shown



Drawing Title	Earbuds Project	
Drawn By	Mr Douglas	
Teacher		
Course	Graphic Communication N5	
School	Springburn Academy	
Scale	3 : 1 (unless specified)	
Date		
Sheet	4 / 4	ALL DIMS IN MM (DO NOT SCALE) (IF IN DUBT, ASK)
Non-Functional Tolerances		+/-0.25MM +/-0.1°
Manufacture Information		
Note		

1c Produce an exploded isometric view of the earbud.

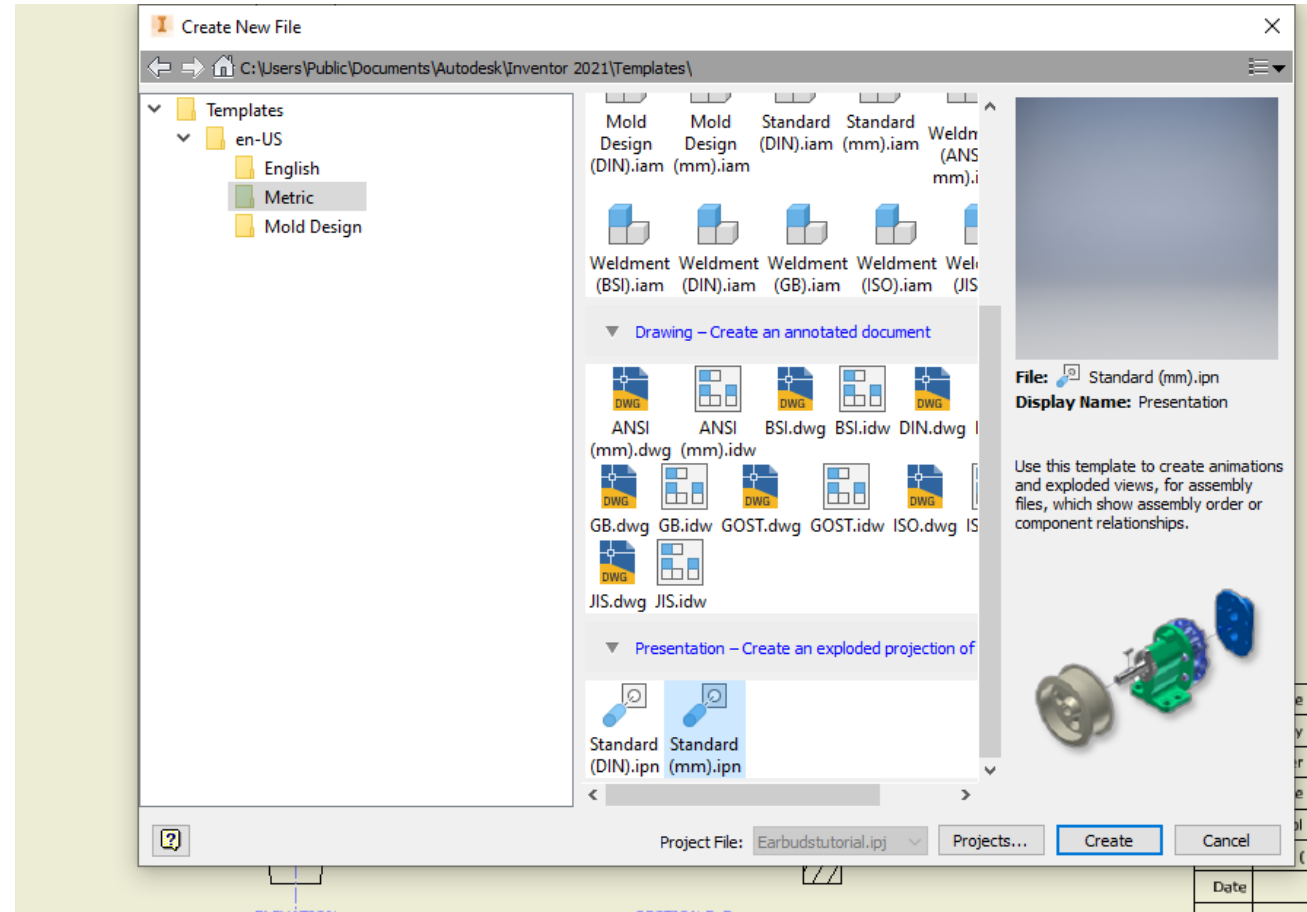
You must produce this view in the same orientation as shown on data sheet 1a for the earbud assembly.

You must produce this as a line drawing and it must not show hidden detail.

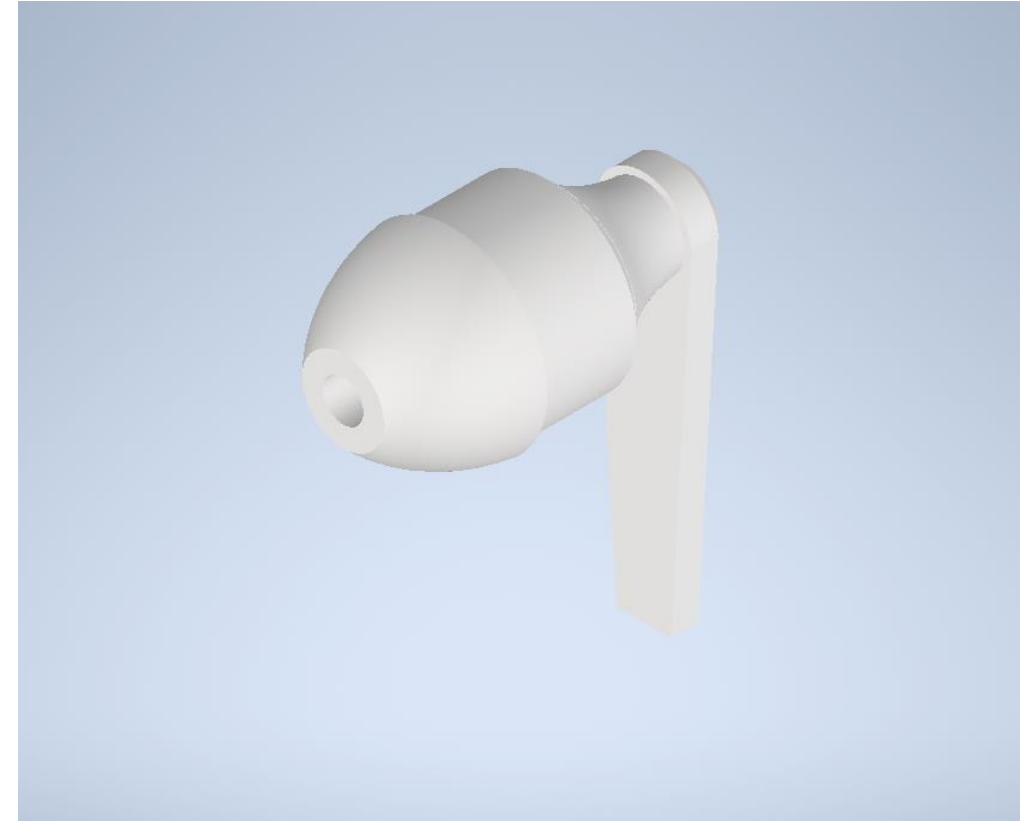
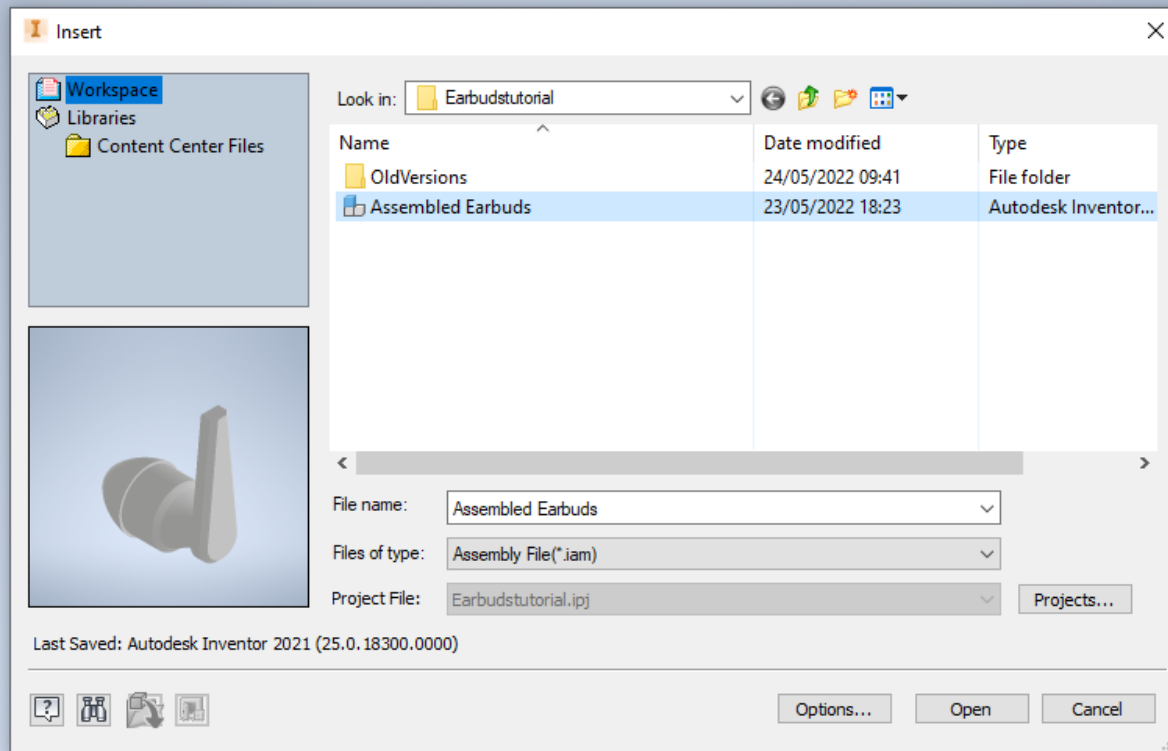
This exploded isometric view must not be rendered.

(2 marks)

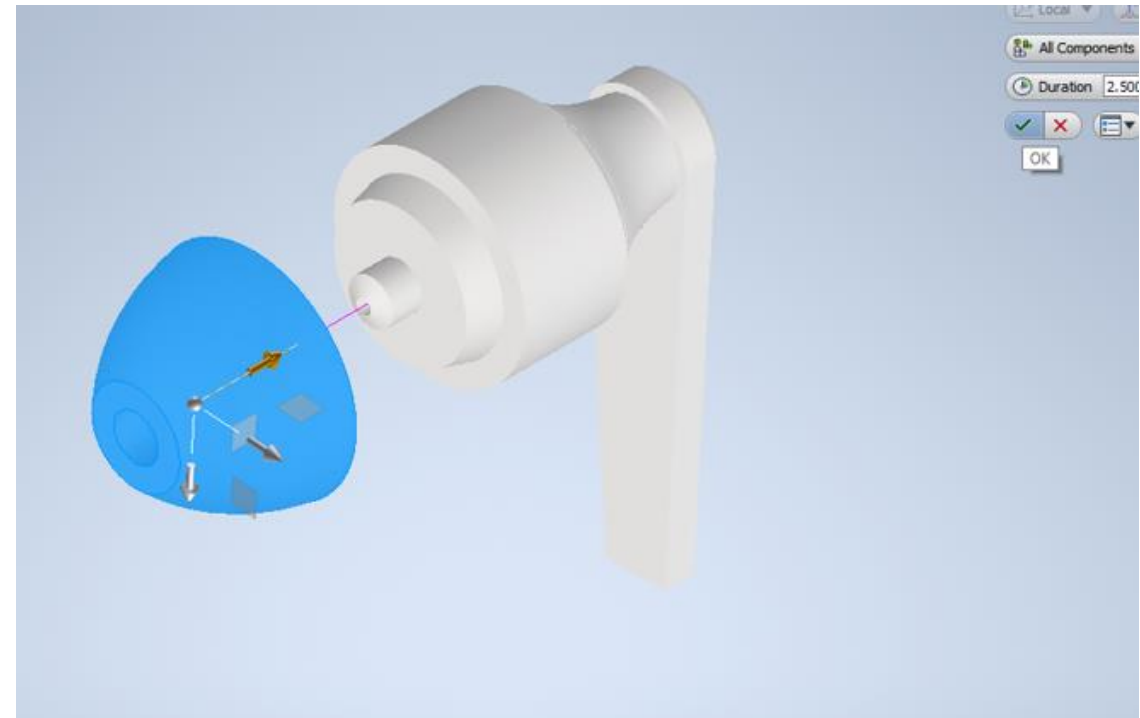
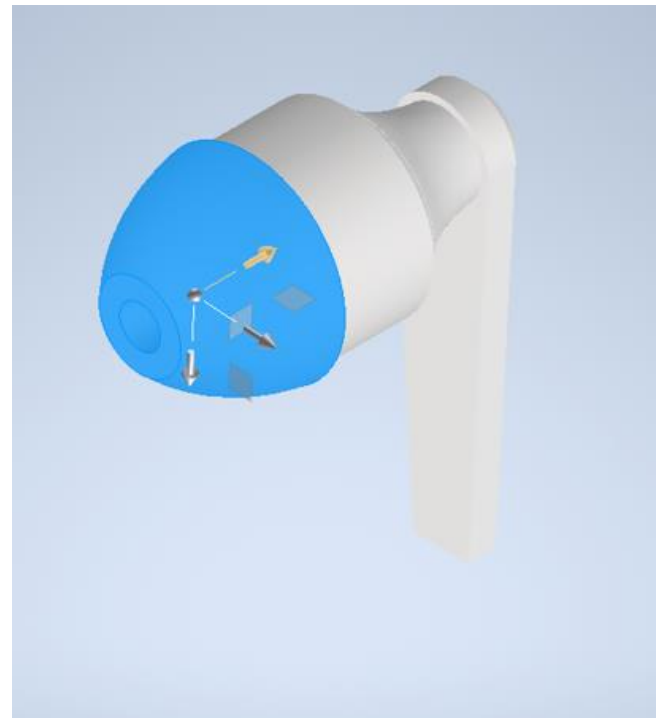
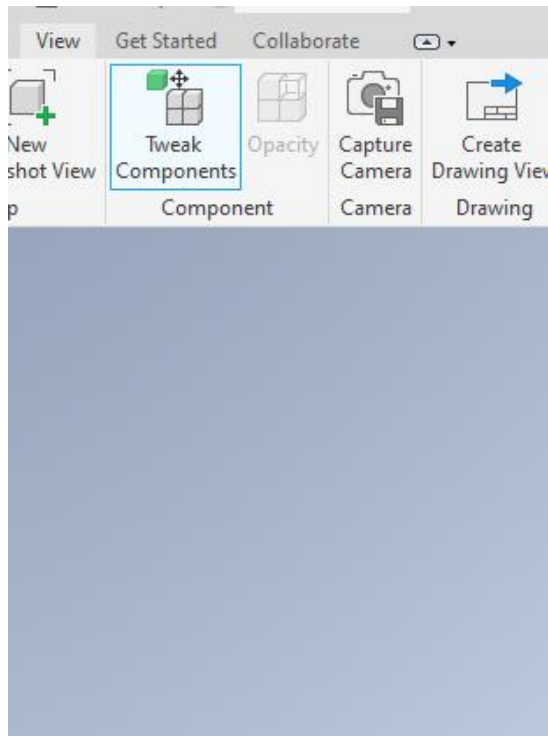
Create a new metric presentation file (.ipn)



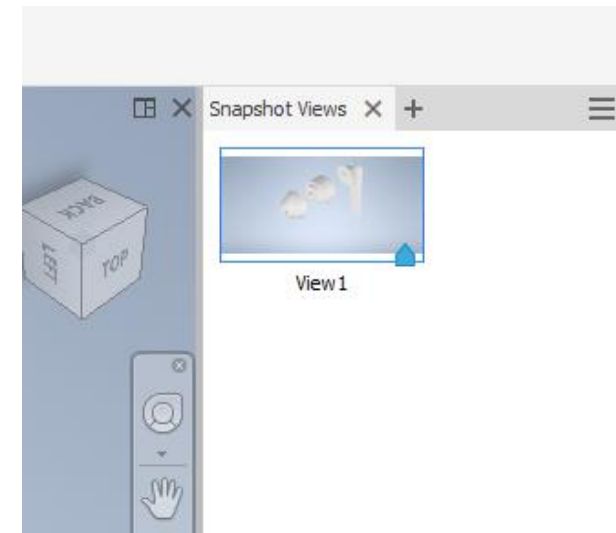
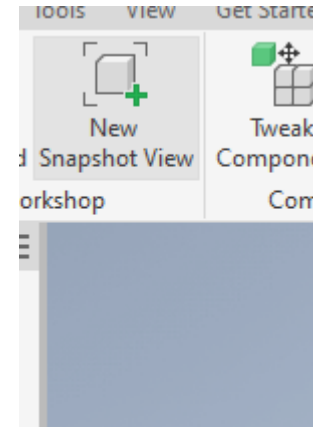
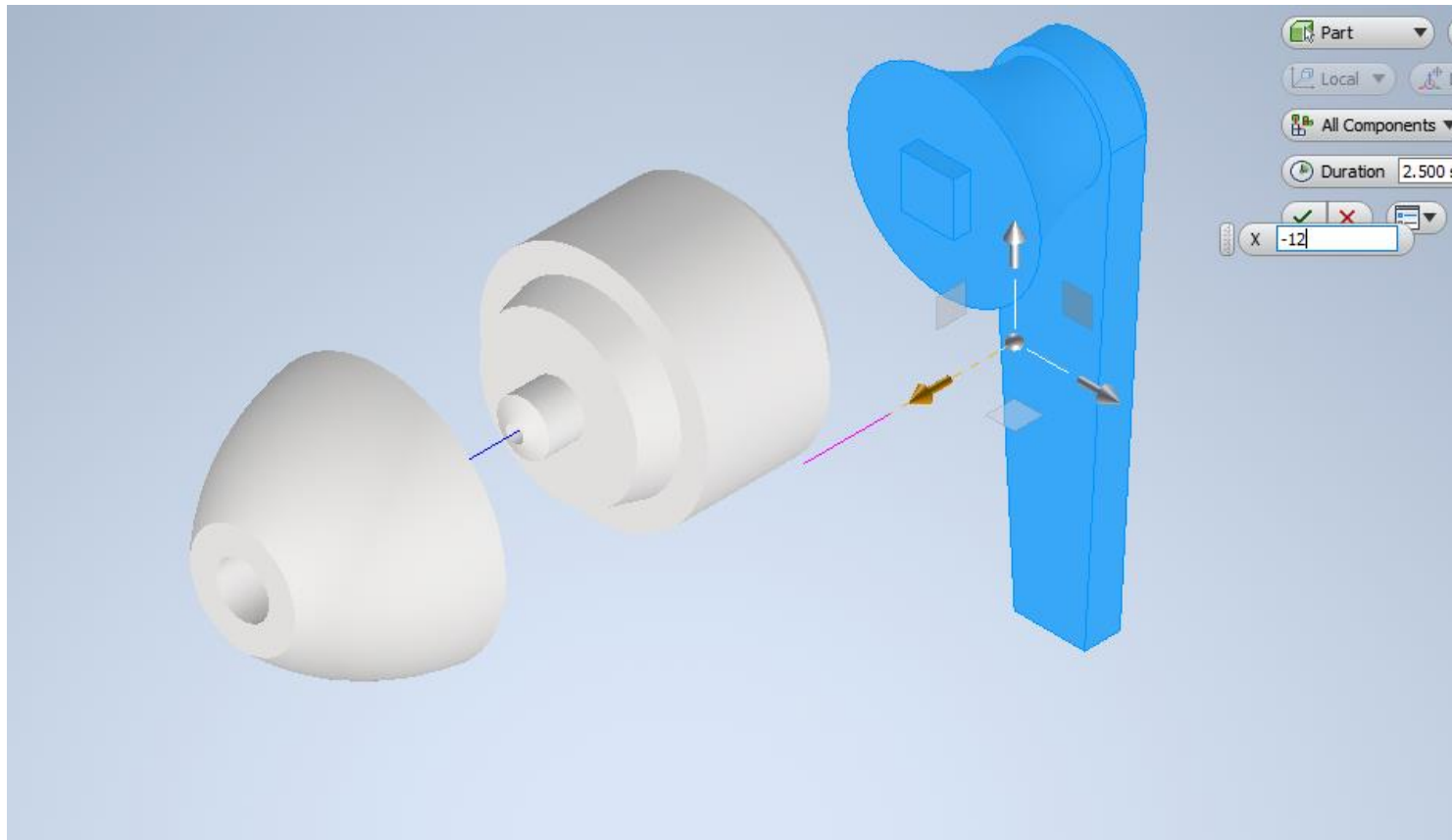
Select the assembly file and orientate it as shown



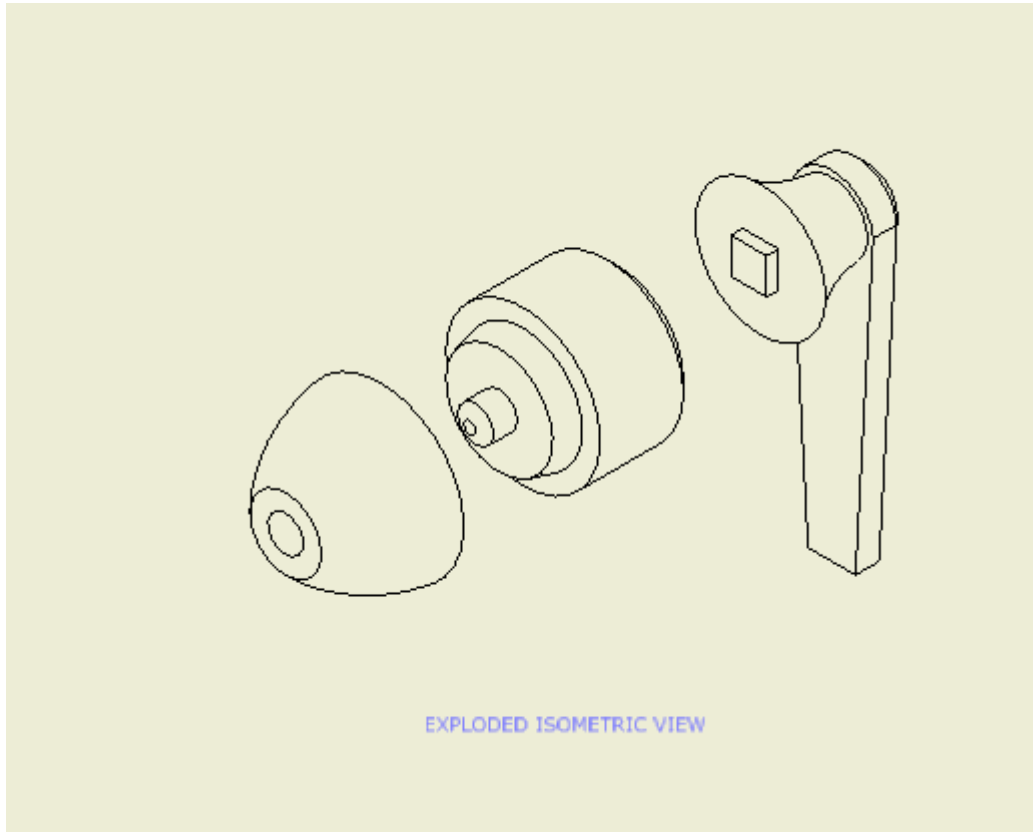
Select tweak components, highlight a component
drag the component by the arrow to a suitable
distance there should be no overlap then ok.



Repeat the process for the other component, click new snapshot view then save.



Place view into drawing orientated as shown, label as exploded isometric view. Print out on A3 and place in your folder.



Marking Instructions, see where the marks are awarded

Detailed Marking Instructions

In all cases, where the candidate's work does not meet the lowest range statement, or where no evidence is provided, then zero marks should be awarded.

Task		Expected response	Max mark	Additional guidance
1.	(a)	<p>Related orthographic drawings and sectional views of the Earbud; earpiece, main body and wireless connector.</p> <p>Three related views of each component. Must be fully correct, including hidden detail;</p> <ul style="list-style-type: none"> • Earpiece (1 mark) • Main body (1 mark) • Wireless connector (1 mark) <p>Correct section of end elevation and orientation across all three components. (1 mark)</p> <p>Enough dimensioning to allow for manufacture. (1 mark)</p>	5	<p>If candidate has not dimensioned the individual components, marks should be awarded where the views contain all relevant features and appropriate proportion.</p> <p>You may wish to look at other evidence in this task to help you make your judgement.</p> <p>Where evidence of dimensioning shows the potential for automatic rounding up having taken place due to a decimal point, award the mark for the component being correct.</p> <p>Apply follow on rule where appropriate.</p>
	(b)	<p>Related Orthographic Views of Assembly:</p> <p>Accurate assembly - no overlaps and no gaps. (1 mark)</p> <p>Relevant section, cutting through the vertical centreline. (1 mark)</p> <p>All views related and orientated correctly. (1 mark)</p>	3	<p>Apply follow on rule where appropriate</p>

Task		Expected response	Max mark	Additional guidance
	(c)	<p>Exploded isometric view of assembly:</p> <p>Correct orientation (isometric and orientation from data sheet 1a). (1 mark)</p> <p>Correct spacing and alignment - no overlap of components. (1 mark)</p>	2	<p>All components must be exploded to achieve full marks.</p> <p>Where colour has been applied, only award marks where visible edges (lines) are evident.</p> <p>Where only a fully rendered image is provided a maximum of 1 mark can be awarded if the spacing and alignment is correct.</p> <p>Apply follow on rule where appropriate.</p>
	(d)	<p>Standards and conventions:</p> <p>Sufficient range of evidence correct across all drawings. (3 marks)</p> <p>Sufficient range of evidence with some inconsistencies. (2 marks)</p> <p>Sufficient range of evidence with many inconsistencies. (1 mark)</p> <p>Poor range and/or many inconsistencies. (0 marks)</p>	3	<p>Evidence will come from:</p> <ul style="list-style-type: none"> • dimensioning • 3rd angle symbol • 3rd angle projection • suitable scale • component titles • line types • view labels • title blocks • correct hatching.